0.12 AUTOMATION AND THE KITCHEN

Gould, Wilbur A. (Ohio State University)
Food Packer 37, 36, 48 (May 1956)

"Automation and the Kitchen" was the subject of a talk given by Mr. J. B. Anderson, chairman of the Food Committee of the Instrument Society of America, at a recent meeting of the National Canners Association.

As the manufacture of food has gradually moved from the home kitchen to the commercial kitchen, a steady application of scientific and technical principles has relentlessly changed the process of preparing food for the family table from an art to a science; from individual production to mass production; and from physical and mental effort to mechanical and technical effort. These trends necessitate the use of the techniques of automation.

"Basically," Mr. Anderson said, "we consider the food industry a process industry, in which a combination of manual and mechanical functions results in the processing of raw materials in such a way as to supply a safe appetizing food of high quality and reasonable cost which can be stored and distributed to the families of the world. Application of the principles of automatic control serve to: (1) increase quality; (2) reduce manufacturing costs; and (3) substitute for unfavorable manpower."

The advantage of mechanical, electrical, electronic, pneumatic, and hydraulic control devices over manual controls is their ability to function repeatedly without deviation and fatigue. Used to regulate such elements as flow, pressure, temperature, rate of feed, weight, and ingredient ratios, automatic controls are able to consistently produce a product of uniform quality.

(over)

ABSTRACTER: Kathryn L. Osterhaug

0.36 FUNCTION OF THE RED MUSCLE IN FISH

Braekkan, Olaf, R. (Governmental Vitamin Laboratory, Norwegian Fisheries Research Institute, Bergen)
Nature 178, 747-748 (October 6, 1956)

Comparative analyses have demonstrated that the deep-seated red muscle of tunny (Thunnus thynnus) contains several times more of the B-vitamins, other than niacin, than the neighboring ordinary muscle.

Similar investigations were made on other species. Some representative results are given in table 1 (see over). The results showed that, apart from niacin, all the other B-vitamins investigated are present in much higher concentration in the red than in the ordinary muscle. The general distribution in the red muscle is similar to the values found in the liver.

In most fishes the red muscle has a much higher fat content than the neighboring ordinary muscle. Values for samples from mackerel, herring, and halibut were about 27 to 29 percent. Muscles with high fat content are not suited for strenuous and continued activity. Assuming the red muscle is less active, it would be expected that under the anaerobic conditions which prevail during the death struggle, the breakdown of glycogen to lactic acid would be less in the red than in the neighboring ordinary muscle. Analysis of the two types of muscle in frozen tunny gave the following values:

	Red muscle	Ordinary muscle
Glycogen	1 percent	trace
Lactic acid	0.8 percent	1.6 percent

(over)

ABSTRACTER: Kathryn L. Osterhaug

0.32 FRESH FISHERIES PRODUCTS, SPOILAGE

Bramstedt, F.
Allgemeine Fischwirtschaftszeitung 7, No. 20, 1-2 (May 21, 1955) (In German)
World Fisheries Abstracts 7, 33 (May-June 1956)

By paper chromatography and electrophoretic methods, 10 low molecular weight compounds besides 4 to 5 protein fractions were detected in fish flesh. Most of the compounds proved to be free amino acids. The high content of free amino acids (0.3 to 0.5%) is held responsible for the relatively fast bacterial spoilage of fish flesh in comparison to flesh of warm blooded animals. Most interesting was the presence of β-alanine which does not occur in a free state in the living animal organism and its increase during storage. It seems that β-alanine is formed within 2-5 days at storage temperatures of 2° C. (35.6° F.) mainly by decarboxylation of aspartic acid. Furthermore, changes in leucine, isoleucine, and valine content appear during the first few days of storage. As products of decarboxylation of lysine (piperidine, N-aminopiperidine, δ-aminovaleric aldehyde) are essentially involved in the formation of the unpleasant fish odor, the part of the decarboxylases in those processes should be investigated and means for their inhibition should be looked for. Of the separated fractions, one fraction 'hr' rich in lysine and the not yet chemically defined fraction "PR" undergo distinctive changes during the first few days of storage. It is expected that these studies may open new ways for the development of objective fish testing.

ABSTRACTER: W. Partmann

0.6 PROGRESS IN FOOD SCIENCE BY THE DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Anonymous
Food Manufacture 31, 179-181 (May 1, 1956)

Frozen beef.--The study of fresh, chilled, and frozen beef has been continued. See also the experiments on blast freezing described in FOOD MANUFACTURE, May 1955, p. 198. Freezing beef in an air-blast tunnel operating at -35° C. with speeds up to 1,000 lineal ft./min. or more is now practical. These operating conditions have resulted in a saving in time and labor because the sides of beef can be frozen within 24 hr. instead of the former method of chilling for 1 to 3 days and then freezing for 3 to 4 days. The overall loss of weight during air blast freezing is less than the weight loss by the former method. Blast freezing, however, yields meat of lower palatability than slow frozen meat.

Treatment of the live animal in such a way as to give rise to low acid beef after slaughter also affects meat palatability adversely. This is unfortunate because low acid beef drips less after freezing and thawing than normal beef. The possibility also exists for diminishing drip without affecting the acidity of the beef by injecting magnesium sulphate in sufficient quantities to relax the animal before slaughter. Injections with phosphate or pyrophosphate may have the same effect.

Test for fish freshness.--Papers impregnated with a colorless tetrazolium salt, which is turned red by the action of certain bacterial enzymes, have been developed to meet the need for a quick convenient, simple, and reliable method for assessing the market quality of fish. The speed and depth of the color produced in the papers is directly related to the total activity of the bacterial population of the fish. The papers are used by laying them on the wet surface of the fish and reading the depth of color that developes against color standards. Time is a factor in the color test. Correlation between quality and color production are reasonably good.

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ABSTRACTER: Martin Heerdt

AUTOMATION IN FOOD PROCESSING

FREE AMINO ACIDS IN FISH

RED MUSCLE IN FISH

PROGRESS IN FOOD SCIENCE

0.32

0.6 (Cross References: 3.230, 3.4, 7.8)

Smoke curing.--A new smoke producer that is constructed on the "fluidiser" principle has been developed and is the subject of two British patent applications. Sawdust for producing smoke is maintained in a state of violent agitation in a vertical tube by a blast of hot air. The chemical composition of the smoke produced depends on the temperature of the air, and the amount of smoke produced depends on the weight of sawdust being treated. Therefore, the type and amount of smoke passing into the chamber are controllable. A recording optical-density smokemeter also has been constructed. Electrostatic smoking of fish can be accomplished in existing kilns without any elaborate structural alterations. The method reduces visible effluent and decreases atmospheric pollution.

0.12 (Cross Reference: 3.23, 3.33)

Reduction in manufacturing costs can stem from several different sources. The most common reduction is through savings in direct labor, although savings may also result from elimination of ingredient waste, maintenance, replacement costs, or even in capital investments.

The extent to which instrumentation can be applied by the manufacturers of food products varies from simple to complex. The basic components of any automatic control application usually fall into the following categories: (1) a sensing element; (2) a relay; and (3) a controlling element.

Accessories as needed for such functions as recording and integrating processing variables can be readily added to these basic steps.

Summarizing his talk, Mr. Anderson said, "As far as the future is concerned, I can only speculate and base my speculations on trends I have observed in the food industries and other industries. Many industries are able to justify a rapid changeover to the most complicated methods of control, including graphic panels, miniature components, data reduction systems, etc.; but for the manufacturing end of the food industry I can see continued steady advances in the applications of the principles of instrumentation and a gradual evolution toward the performing of many of the manufacturing functions by technological methods. As advances are made in control of raw materials and as process procedures become more and more of a science instead of an art, it appears that the food industry will inevitably proceed to the 'push button' factory which will result in better products at lower costs. I am convinced that the future will find that the food industry has one of the greatest potentials in the application of technological developments."

0.36 (Cross Reference: 8.64)

The red muscle contains relatively high concentrations of the B-vitamins as well as myoglobin and cytochrome *c* which are parts of the enzyme system that carries out oxidative metabolism. It may therefore be concluded that the red muscle is able to carry out synthetic processes similar to those taking place in the liver. It seems likely that the main purpose of the red muscle is not muscular work, but that it functions as an organ.

When considering the amount of red muscle in relation to the normal activity of the fish species it is interesting to note that the tunny, a very active and fast-swimming fish, had the highest proportion of red muscle of those examined. Next came mackerel and herring, which also move rapidly. In contrast, halibut as a flatfish has less and a paler muscle.

Table 1. Vitamin contents of liver, red muscle and ordinary muscle from some species of fish

Species	Sample of	Niacin (μgm./gm.)	Pantothenic acid (μgm./gm.)	Riboflavin (μgm./gm.)	Vitamin B_{12} (μgm./gm.)	Thiamine (μgm./gm.)
Tunny (*T. thynnus*)	Liver	87	26.0	46.0	3.10	3.7
	Red muscle	100	32.8	7.9	0.38	4.3
	Ordinary muscle	122	5.0	1.5	0.047	2.5
Mackerel (*S. scrombus*)	Liver	79	33.3	11.3	0.52	4.0
	Red muscle	97	30.0	13.8	0.11	3.7
	Ordinary muscle	107	3.8	1.6	0.015	0.2
Halibut (*H. hippoglossus*)	Liver	30	9.0	7.0	0.89	2.5
	Red muscle	31	5.2	2.5	0.05	0.35
	Ordinary muscle	44	3.6	0.6	0.009	0.40

1.92 COMMERCIAL FISHERIES OF THE PRAIRIES

Butler, G. E. (Department of Fish Culture, Manitoba, Canada)
Canadian Fisherman 43, 6, 8, 10 (August 1956)

The problems concerned with the production of first quality fresh-water fish are shared by both the commercial fishermen and fish processors. For fish to reach the market in top condition, the fisherman must lift his nets at regular intervals, daily in the summertime, so that only prime quality fish are caught. He must carry ice in his boat to chill the catch immediately after it is taken from the nets.

When dressing fish, he must make clean cuts with the knife and remove completely all entrails and blood. The gills and viscera are removed from whitefish, from pike the head is also removed. Pickerel may be packed either in the round or dressed depending upon the market demand.

The fisherman must use care to avoid bruising the fish during handling. Loaded fish boxes must be handled without jarring.

The dressed fish are weighed and packed quickly into boxes lined with heavy waxed paper. The boxes are iced with finely chopped ice at the bottom, middle, and top. The insulating effect of the wax paper causes the ice to melt slowly. After packing, the boxes are stored in a cold room at a temperature close to freezing.

Proper handling of the fish, especially in the early stages, is a critical factor in the ultimate quality of the product, and both fishermen and processors are becoming increasingly conscious of its importance.

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ABSTRACTER: Kathryn L. Osterhaug

1.95 COMMERCIAL UTILIZATION OF DOLPHINS (PORPOISES) IN CEYLON

Lantz, A. W. and Gunasekera, C.
Department of Fisheries Bulletin No. 3, 13-14 (1956) (Ceylon)

Two species of dolphin found in waters adjacent to Ceylon, are the common dolphin (Delphinus delphis) and the bottle-nosed dolphin (Tursiops truncatus). Both of these species are predators. They damage fish nets by attacking the fish that are trapped in the net. Dolphin damage to nets is particularly pronounced when fish populations in a particular area become somewhat depleted.

Dolphins can be successfully pursued and captured from a motor boat by the use of a simple hand harpoon with a detachable dart and bladder buoy. Fresh dolphin flesh sells readily on the market despite some local prejudice against its naturally dark color. Dolphin flesh is nutritious and can be used successfully in both western and eastern styles of cookery. Every effort should be made to popularize dolphin flesh as a high quality protein food. Dolphin flesh should be sold at a reasonable price so that low-income groups may benefit from its use and nutritional properties.

Dolphin flesh can be cured in a standard sweet pickle mixture and yields a product that can be stored for months under refrigeration. The flesh can also be salted and dried to produce a salted meat product. Mechanical drying of the flesh is required because fungus growth during sun drying is very difficult to control.

The skin of the dolphin can be tanned to yield at least two kinds of excellent quality leather. The blubber layer, which lies immediately under the skin, can be rendered into commercially valuable oil. Unused portions such as parts of the head, the bones, viscera and flesh trimmings can be processed into bone and meat meal for use in animal feeds.

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ABSTRACTER: Martin Heerdt

1.95 OIL FROM THE MEAT OF SPERM WHALE (PHYSETER CATODON)

Pedersen, Torbjorn
Norsk Hvalfangst-Tidende 41, No. 6, 296-298, 300 (June 1952)

Oil from the meat of sperm whale.--Sperm whale meat from the back muscles contained 72.8 to 74.3 percent water, 1.6 to 4.84 percent oil, 22.12 to 23.45 percent protein, and 0.97 to 1.16 percent ash; from the muscles underneath the spinal column 73.18 to 75.67 percent water, 1.18 to 2.79 percent oil, 21.66 to 23.93 percent protein, and 1.03 to 1.12 percent ash; from the belly 71.55 percent water, 5.75 percent oil, 21.37 percent protein, and 1.29 percent ash; and from the ribs 61.20 percent water, 8.47 percent oil, 21.01 percent protein, and 1.39 percent ash. Oil from sperm whale meat boiled in water had the following characteristics: acid value 1.24 to 3.96, saponification value 123 to 148, iodine value 68.1 to 96.8, unsaponifiable matter 27.3 to 38.5 percent, iodine value of unsaponifiable matter 59.9 to 72.2, and cholesterol content 0.44 percent. Oil from sperm whale meat extracted with ethyl ether had characteristics as follows: saponification value 124.6 to 138.0, iodine value 77.4 to 85.6, unsaponifiable matter 35.3 to 39.3 percent, and iodine value of unsaponifiable matter 63.8 to 64.6.

The milk fat of sperm whale.--Peruvian sperm whale milk drawn in October 1951 from a 36-foot whale 1 hour after death and preserved with ethyl alcohol contained at least 30 percent ether extractable material, which was a viscous liquid at 68° F. and had the following characteristics: iodine value (Wijs) 161.5, saponification equivalent 302.0 (neutralization equivalent of fatty acids 285.0) unsaponifiable matter 0.74 percent, acid value 0.27, content of saturated acids (Bertram method) 31.2 grams per 100 grams of acid, equivalent weight of saturated acids 258.0. Wax and fatty alcohols, which are present in ordinary sperm whale oil, are absent from the milk fat. The sperm whale milk fat resembles the milk fats of blue, fin, sei, and humpback whales, but the equivalent weight of both the saturated and unsaturated fatty acids is higher for the sperm whale milk fat.

ABSTRACTER: Martin Heerdt

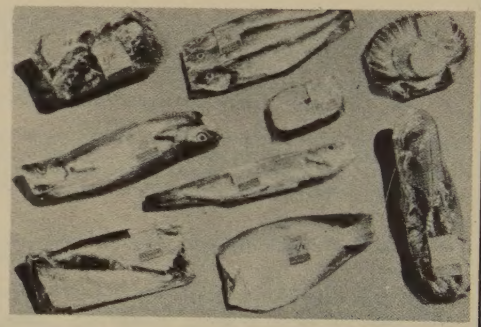
2.43 PRE-PACKAGED WET FISH

Anonymous
Food Manufacture 31, 259 (June 1, 1956)

Pre-packaged wet fish has been introduced by Lyons in their supermarket at Cadby Hall. Believed to be the first major store to sell wet fish and shell fish the self-service way, Lyons report high sales and popularity for the new goods.

The fish is prepared on the spot--pre-packaged in moisture-proof Cellophane cellulose film and displayed in open-top refrigerator cabinets.

Methods of wrapping vary with different types of fish. Whole fish and fillets are placed on small pieces of cardboard (roes are put on fibre trays) and overwrapped with Cellophane. Packs are then closed by heat-sealing the film against the cardboard base. Crabs, scallops or lobster claws are wrapped without a cardboard base, the hard shell being a satisfactory surface on which to seal the film. Pre-packaging is completed by applying thermoplastic price labels



Wet fish packed in cellulose film.

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Reprinted in whole

HANDLING FRESH-WATER FISH

FAT FROM WHALE

UTILIZATION OF DOLPHIN

PRE-PACKAGED WET FISH

1.95 (Cross Reference: 4.14)

2.43

with a sealing-iron.

The full pre-packaged range includes every fish normally sold by "orthodox" fishmongers. Smaller items, such as herrings and whitings, are made up into packs containing 2 or 3 fish, whitings intended for consumption by the cat being packaged whole. Cod cutlets, fillets of plaice and other popular cuts of various sizes are also pre-packaged.

1.92 (Cross Reference: 1.0111, 2.3)

From the fish plant, the fish usually go to the large fish exporting companies and are transported to rail connections on company-owned trucks or tugs. Modern fish-freighting tugs are now equipped with mechanical refrigeration in the holds and the fish can be kept at optimum temperatures (30° to 32° F.).

Methods of loading and unloading have also been improved. Mechanical conveyors are used to elevate the boxes from the holds which reduces the jarring that accompanies manual unloading, when fish boxes of necessity have to be more or less pitched. The impact bruises the tissues of the fish within the box due to violent contact with the chopped ice, which usually becomes solidified after being packed with fish for some hours.

In brief, the factors necessary for a first class fish product are speed, careful handling, and low temperatures throughout the operation.

Processing operations for the different species of fresh-water fish vary to some extent. The filleting operations for pickerel, sauger, perch, and northern pike are very similar. Pickerel and saugers may be scaled, or the fillets may be skinned. Northern pike are usually scaled and filleted. Fillets are weighed, wrapped and packaged, and the packages are moved into a quick-freezing compartment as quickly as possible. Individual freezing of some of the larger fillets, such as those from whitefish, is sometimes done. Such fillets are placed on zinc pans and individually frozen in the sharp freezer, after which they are glazed by dipping in water. Such fillets are usually packed in five to twenty-five pound cartons for the retail and restaurant trade. Most of the pickerel and sauger fillets are packaged in attractive one-pound packages for the family trade.

(Pickerel in Canada is the same species as yellow pike in the United States, while pike refers to our pickerel or Northern pike).

1.95 (Cross Reference: 1.015)

This study has shown conclusively that there are commercial possibilities in the capture and utilization of dolphin. In some countries, particularly Japan, dolphin flesh finds a ready market. In the event of large dolphin catches, it may be possible to export the surplus flesh. Due to the present lack of equipment, no effort was made to preserve the flesh by canning. However, canning may also prove satisfactory, for processed dolphin flesh products.

Analysis of a specimen of common dolphin

Part	Total body weight	Moisture	Ash	Fat	Protein	Calories/lb.
	%	%	%	%	%	
Edible flesh	38	73.0	1.8	1.5	23.5	500
Skin and blubber	16	26.0	10.0	50.2	14.0	2,370
Head	10	57.7	19.0	5.4	18.0	562
Bones	16.5	41.5	30.0	3.3	25.0	604
Tail and fins	2.5	23.5	8.0	48.5	19.9	2,416
Liver	2.5	76.0	4.0	2.0	8.7	246
Intestines	7	81.0	2.5	7.0	8.0	465
Other viscera	4	81.0	2.0	2.5	8.3	260

1. Protein=Nitrogen x 6.25: Calories calculated from fat and protein on the basis 1 percent fat 42.2 Calories and 1 percent protein=18.6 Calories (per pound of constituent).

2. Oil from dolphin liver had a Vitamin A potency of over 6,000 international units per gram but the yield was low. It required 500 pounds of liver to yield a gallon of oil. Twenty pounds of shark liver will yield a gallon of oil of similar vitamin potency.

1.95 A NOTE ON HUMPBACK (WHALE) OIL AND ON THE MILK AND MILK FAT FROM THIS SPECIES (MEGAPTERA NODOSA)

Pedersen, Torbjorn (Sandar Fabrikker A/S, Sandefjord, Norway)
Norsk Hvalfangst-Tidende 41, No. 7, 375-378 (July 1952)

Samples of humpback whale oil from Cape Lopez, Congo, in 1949 and 1950, respectively, had the following characteristics: free fatty acids 1.62 and 1.30 percent; (Wijs) iodine value 134.4 and 135.8; saponification equivalent 287.0 and 283.0; unsaponifiable matter 0.88 and 0.64 percent; saturated acids 27.1 and 27.0 grams per 100 grams of acid, equivalent weight of saturated acids 251.0 and 250.9, and (Wijs) iodine value of saturated acids---and 0.48. A sample of humpback whale milk collected December 31, 1949, preserved by heating to the boiling point, and stored in a refrigerated room; and a sample sample of humpback whale milk from the North Pacific contained, respectively, 38.5 and 38.48 percent fat, 46.7 and 47.48 percent water, 14.8 and 14.04 percent dry matter, and 1.33 and---percent ash. No reducing sugars were found. The characteristics of humpback whale milk fat and Antarctic blue-whale milk fat, respectively, were as follows: iodine value 161.7 and 171.8, saponification equivalent 289.6 and 290.0, unsaponifiable matter 0.40 and 0.41 percent, acid value 0.37 and 0.68, saturated acid acids 32.9 and 33.2 grams per 100 grams of acid, and equivalent weight of saturated acids 250.1 and 250.0. The fully saturated glycerides in humpback whale milk fat were determined by the method of Hilditch and Lea (Hilditch 1947, p. 513). From 47.5 grams of milk fat, the author isolated 23.7 grams of saturated glycerides after the first oxidation. The method of Stegar and Van Loon (Hilditch 1947, p. 515) was used to remove the acidic products after the third oxidation, and 1.345 grams of glycerides with an acid value of 0.9 and an iodine value of 1.1 was obtained. This means less than 2.8 percent saturated glycerides.

ABSTRACTER: Martin Heerdt

2.114 WIRE AND CHAIN LIFE INCREASED BY BALL BEARING SHEAVES

Grindrod, John
Canadian Fisherman 43, 25, 27 (May 1956)

Practical tests have demonstrated that wires and chains last more than twice as long on fishing vessels that have ball-bearing equipped sheaves and rollers than on vessels equipped with plain bearings.

Because of the intensive operation of modern fishing vessels and the consequent powerful haulage equipment used, sheaves are subjected to extremely heavy stresses. The most heavily loaded are those that are mounted in the gallows, one forward and one right aft. Conventional sheaves often have a tendency to seize in spite of frequent lubrication and when this happens grooves are worn in their tracks and the galvanizing of the trawl wire becomes damaged. In the course of experiments it was found that the incorporation of ball bearings eliminated the tendency to seize.

A single forward gallows sheave fitted with two deep groove ball bearings and which requires lubrication only every three months is being manufactured from a special cast iron with high wear-resisting properties. Sealing is effected by three sets of labyrinth sealing washers fitted at the counter side of each bearing. Lubrication is effected through the spindle.

A double block, one of whose sheaves is larger than the other, is designed for mounting in the stern gallows. In order that the spindle may be fitted either way round during mounting, the lubricating ducts are drilled exactly alike from both ends.

After the trawl lines have passed over the sheaves in the gallows, they are led through deck

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ABSTRACTER: Kathryn L. Osterhaug

2.1125 PURSE SEINE USING TWO PURSE LINES (RUSSIAN TECHNIQUE FOR PREVENTING ESCAPE FROM SEINE)

Samaryanov, A. N.
World Fishing 5, 37-40 (May 1956)

By the use of echo-sounding methods, it has been established that large concentrations of fish stay at a considerable depth, where they are very hard to catch with conventional purse seines, for long continuous periods of time. It is therefore desireable to improve purse seine construction and increase net dimensions so that fish can be caught in bulk at depths of 25 to 28 fathoms. By substituting more durable artificial fibres for cotton it is possible to increase the dimensions of purse seines by lightening the weight of twine used in their manufacture.

For fishing at even greater depths, a submersible purse seine has been designed. The operating principle of this net differs from the traditional one in that it is worked by additionally loading the foot rope in such a way as to give the set depth. Float strops are fastened at one end to the head rope of the purse seine, and at the other end to additional floats. During regular purse seine operations the purse line is tightened and raised to the side of the vessel. The net, having its weight reduced in this manner, comes to the surface of its own accord with the help of the floats fitted along the head rope.

Echo sounders have also made it possible to study fish behavior during fishing operations at considerable depths. It has been found possible to establish the depth at which the shoal is swimming and the accuracy with which the net is set.

In spite of the improved fishing methods and fishing gear, a large proportion of the fish often get out of the net even after they have been successfully encircled. This is often the case with shoals that

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ABSTRACTER: Kathryn L. Osterhaug

2.9 STUDIES ON PUTREFACTION OF AQUATIC PRODUCTS

Simidu, Wataru and Hibiki, Sigeyuki
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 5, 357-367 (1955) (English abstracts, and tables)

XXI. Consideration on difference in putrefaction for various kinds of fish (4)--On difference of concentration of histidine between the interior and the exterior of cells.--For the purpose of considering that difference in production of histamine in the course of putrefaction according to the kind of fish may be attributable to the variation in the concentration of histidine that can be found in each case of the inner part of cell and the intercellular space, we have estimated the concentration in dripping, juice pressed and residue getting from fresh, frozen, incubated or salted fish.

As the results, we have found that the concentration of histidine in the residue seems to be higher than that in the dripping or the juice, and this tendency was especially marked in the salted fishes. From these facts, we have assumed that the histidine may be contained in a larger amount in the inner part of cells than in the intercelluler spaces, and it must be a cause of difference in production of histamine according to the kind of fish.

XXII. On Poisoning of spoiled fish.--We have examined the power of poison of spoiled fish by the hypodermic injection of saline water extractive of it into the mice.

Each extractive of both white muscle fish and reddish muscle fish has been found to be able to kill any mouse, but its efficacy seemed to decrease by the cooking or in the further progress of putrefaction. The cooked extractive of reddish muscle fish has been indicated to be harmful, but only at higher concentrations.

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Authors' summaries

WHALE OIL AND MILK ANALYSES

PURSE SEINE TECHNIQUE

BALL BEARING SHEAVES

HISTAMINE POISONING FROM FISH

2.1125

have been encircled at depths greater than 8 to 10 fathoms, and the net is frequently empty when it reaches the surface if too much time is spent in the closing operation. It is necessary to draw in the rings on the foot rope quickly to prevent the fish from escaping.

A suggested improvement in the handling of these purse seine is to use two instead of the customary single purse line. A second ship with a towing capacity of not less than 500 kilograms is required for closing the purse. See figure 1.

Experiments indicate that there are many advantages in using two lines. The most important is that the closing operation is speeded up. Uniformity of pull causes the seine to close in a manner similar to a camera shutter rather than taking on an elliptical form as in conventional operations, there is no lifting of the foot ropes, and the possibility of the ship being pulled on to the net during operation is eliminated.

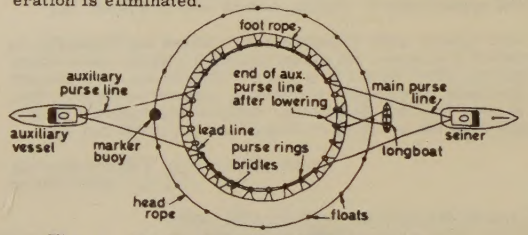


Fig. 1. Closing the seine with two purse lines

2.9

XXIII. On the critical concentration of poisoning for histamine.--The critical concentration of poisoning for histamine in spoiled fishes seems to be about 100 mg. (as dichloride) per 100 gr. of the muscle.

1.95 (Cross Reference: 4.14, 8.7)

2.114

blocks to the winch drums. Because of space limitations, labyrinth sealing washers cannot be used. They have, therefore, been fitted with a simple labyrinth seal at each side of a double bearings. Since lubrication is effected at both sides of the bearing any dirt that may enter is forced out through the gaps.

In order to ensure that the trawl line is wound evenly on the winch drum when being hauled in, most fishing vessels have some form of reeling guide provided. Spinning guides are fitted with two deep groove ball bearings by labyrinth sealing washers. The bar has an overall length of 4 feet 7 inches and the roller is located on the spindle by means of two collars. By moving these collars the winch operator can set the roller at a suitable height from the deck.

With a conventional diameter of 4 or 5 inches, steering gear sheaves, whether for use in single or double blocks, are fitted with one deep groove ball bearing, having labyrinth sealing washers each side for sealing, re-lubrication being effected through the spindle.

A number of other sheaves may also be fitted with ball bearings. For instance, the bow or cathead sheave mounted on the stemhead of the boat for hauling up the anchor cable and the pivoting fairleads mounted on the gunwale over which the sweep-lines run can be fitted in this way.

2.19

SPOILAGE OF FISH IN THE VESSELS AT SEA: 4. EFFECT OF REMOVAL OF GILLS ON RATE OF SPOILAGE

Castell, C. H. and Greenough, Maxine F. (Technological Station, Halifax, N. S.)
Journal of the Fisheries Research Board of Canada 13, 291-296 (May 1956)

It is common practice for fishermen on the Canadian East Coast to remove the gills from cod and haddock as the fish are eviscerated prior to storing the fish in ice in the hold. Fishermen and plant operators believe that removal of the gills during the period May 1 to November 1, increases the keeping time of the fish.

Purpose.--This study was made to compare gilled and ungilled cod and haddock from shore boats and from deep sea trawlers.

Experimental.--The shore-caught fish were gilled or left ungilled as they were caught, iced in boats, re-iced in pens at the Halifax Technological Station, and examined periodically for 12 days. The trawler-caught fish from the first day's catch were left ungilled, or gilled on the deck, iced down in the hold, and examined shortly after they were unloaded.

Ungilled and gilled fish were compared as follows: (1) by grading the whole fish and examining the condition of the gill area; (2) by organoleptic examination of uncooked fillets from comparable ungilled and gilled fish for changes in color, odor, and texture; (3) by determination of trimethylamine values and pH values for each fillet.

Results with dressed whole shore-caught fish stored in ice.--Judging from the odor and appearance of the fish reported in table 1, (see over) removal of the gills retarded spoilage.

Results with fillets from dressed whole shore-caught fish.--There was no organoleptic difference in the color, odor, and texture of fillets cut from gilled and ungilled fish at any stage during 1 to 12 days of storage in ice. Average trimethylamine values, ranges of trimethylamine values within each group, and pH values were almost identical for corresponding whole fillets throughout the storage

(over)

ABSTRACTER: Martin Heerdt

2.6

PUBLIC EATING PLACES SURVEY

Anonymous
Commercial Fisheries Review 18, 34-36 (June 1956)

Popularity of Fish and Shellfish in Public Eating Places:

Canned tuna was found to be the most popular fish, and shrimp the most popular shellfish in public eating places in the United States. The following table ranks the more popular species of fish and shellfish according to region.

Ranking of the More Popular Species Sold in Public Eating Places Serving Fish and Shellfish, by Region, 1955[1/]

Species	United States	Northeast	North Central	South	West
Fish:					
Tuna	1	1	9	10	3
Flounder	2	2	-	3	4
Halibut	3	4	8	-	1
Haddock	4	3	3	6	-
Salmon	5	5	7	9	2
Cod	6	6	6	4	5
Ocean Perch	7	-	1	5	-
Pike	8	8	2	-	-
Shellfish:					
Shrimp	1	1	1	1	1
Oysters	2	6	2	2	2
Scallops	3	2	4	5	5
Lobsters	4	3	3	4	4
Crabs	5	5	-	3	3
Clams	6	4	-	-	6
Abalone	7	-	-	-	7

1/ Ranking is based on total number of establishments reporting a species most often sold as either first, second, or third choice.

(over)

ABSTRACTER: Kathryn L. Osterhaug

2.2

MECHANICAL HANDLING OF OYSTERS

Anonymous
Food Processing 17, 26-27 (October 1956)

A Norfolk, Virginia oyster plant has installed a mechanical handling system to transport oysters through the entire process after the initial shoveling off the boats. Previously, 28 men had been required for hauling oysters by wheelbarrow from the boats directly to the shucking tables and for carrying away the empty shells.

An increased output of 15 to 20 percent has resulted from the use of the mechanized system. In contrast to the 28 men with wheelbarrows, now, one man is required in the shucking room to run the conveyors and one in the storage room to run the front end loader. When boats are being unloaded, a third man is needed to operate the outside conveyors.

In operation, a crew shovels the oysters onto a portable belt conveyor laid across the boat deck. The belt discharges onto a steeply inclined apron conveyor that is pivoted at the head end so that the foot end can be raised or lowered to conform with various unloading conditions. Two such arrangements permit the simultaneous unloading of two boats at the rate of 60 tons per hour each.

From the apron conveyors, the oysters are carried on a system of belt conveyors through a vibrating screen for rough cleaning, and then up over the top of the storage building. Here, the load discharges into a stone box transfer for easing onto a shuttle conveyor located in the storage room.

A front end loader picks the oyster up from the piles in the storage area and dumps them into a floor hopper, where they are picked up by an inclined apron conveyor and carried into the shucking

(over)

ABSTRACTER: Kathryn L. Osterhaug

3.30

CANNED SHELLFISH - DISCOLORATION

Nielsen, K.
Konserves 13, 79 (July 1955)
World Fisheries Abstracts 7, 41 (March-April 1956)

The discoloration of canned crustaceans usually appears as a faint grey or brownish tint. In very bad cases, blue or nearly black colors may be found. The discoloration is evenly distributed throughout the meat with higher intensity around the cavity from which the intestinal duct has been removed, and at places which have been injured, e. g. through bites from other lobsters. Other symptoms, such as off-flavors, are seldom found in connection with discoloration. A number of theories have been put forward regarding the cause of the discoloration, but no definite conclusion has been reached. The only certain fact is that no discoloration appears in the products with pH values of 6. 5 or lower. In the pigment of crustacean blood, copper plays a part analagous to that of iron in the mammalian blood pigment. Lobster may contain as much as 170 mg. of copper/kg., the greater part of which, however, is removed during shelling and subsequent washing. Shrimp contain up to 15 mg. copper/kg. The corresponding values for iron are 4 mg. /kg. in lobster and 25 mg. /kg. in shrimp meat.

The fact that discoloration is most common in canned lobster indicates that the copper content is the agent responsible for the change of color. Copper combines with amines present in the crustacean meat forming a blue compound. The amine content increases quickly in the dead tissue, particularly at places where bacterial activity is high, e. g. where the tissues have been injured. A similar increase of amines is found in semi-preserved crustacean products due to bacterial activity. Such products are nearly always discolored. The blue copper amine compound develops only in media with high pH values, i. e. above 6. 5. Iron does not form colored compounds with amines and only under special circumstances does it combine with sulphur compounds. As copper binds sulphur compounds,

(over)

Poul Hansen

REMOVAL OF GILLS VS. SPOILAGE

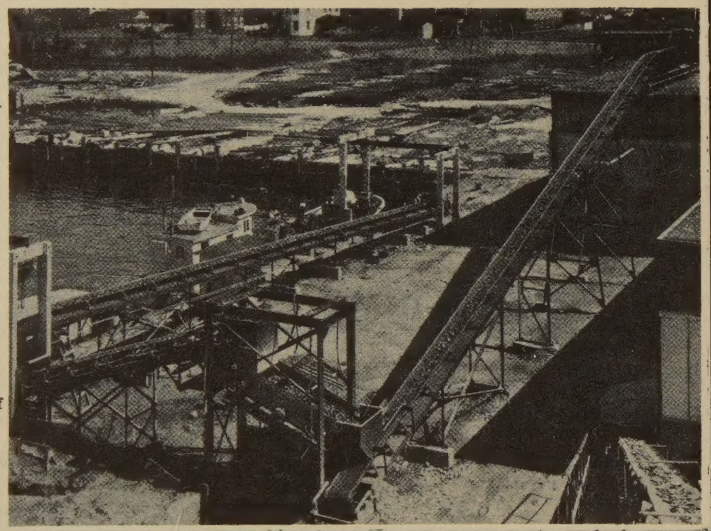
UNLOADING OYSTERS

FISH IN RESTAURANTS

DISCOLORATION OF CANNED SHELLFISH

2.2 (Cross Reference: 1.81)

room. Here a reversible cross-belt conveyor receives them and discharges them to two shuttle conveyors located over the shucking tables. After the meats have been removed by the shuckers and placed in pails, the shells are taken from the area by scraper conveyors located underneath the tables.



This view shows flow of oysters from boats across the vibrating screen to roof of storage building.

3.30

forming a black pigment, combinations of iron and sulphur are unlikely when copper is present. This gives more support to the theory that copper is responsible for the discoloration.

As mentioned above, the major part of the copper content can be removed by shelling and rinsing the shellfish. This provides some security against discoloration. The most important measure, however, is the addition of sufficient acid to the brine which may have the following composition when used for good fresh crustacean meat: 0.7% citric or tartaric acid + 1% salt, 1 to 2% sugar + preservative. More acid may be required for the canning of less fresh raw materials. Excessive amounts of acid, however, may damage the can. The canners should be advised to find the most appropriate quantity of acid for each of the various raw materials. The best pH range is between 6.2 to 6.4; the safest estimation of the pH is obtained by an electrometric pH apparatus.

The can material may cause discoloration through blackening. This may appear on the canned product. It is, therefore, advisable to use parchment linings in the case of tin plate cans, even when these are treated with sulphur-resistant lacquers. Linings are unnecessary in aluminum cans.

2.19 (Cross Reference: 1.5)

period. Even in the portion of the fillets nearest the head there was no difference in the trimethylamine values.

Table 1.--Odor of the gill area in gilled and ungilled, dressed shore-caught cod stored in ice.

Days in ice	Gills in	Gills out	Days	Gills in	Gills out
1	none	none	6	sour	sl. sour
2	none	none	7	sour-putrid	sl. sour
4	sl. sour	none	10	rotten-putrid	sour
5	sour	sl. sour?	12	rotten-putrid	sour-putrid

Results with fillets from dressed whole trawler-caught fish.--The average trimethylamine values of fillets from gilled and ungilled trawler-caught cod and haddock from 5 separate trips showed no discernible difference; table 4, below. There was,however, considerable difference in the odor and appearance of the gill area in the gilled and ungilled whole gutted fish, but no discernible difference in the color, odor, texture, and taste of fillets cut from these fish. Similar results were obtained with scrod cod.

Gill tissue spoilage.--Repeated tests showed that the presence of decomposing gill tissue had no effect on the appearance or trimethylamine values of fillets from adjacent portions of the flesh. Fish having gills with trimethylamine values of 2.3, 7.9, and 14.8 yielded, respectively, fillets with trimethylamine values of 0.32, 0.56, and 1.78; therefore diffusion of spoilage products from gills into fillets is very slight.

Table 4.--Average trimethylamine values for fillets cut from gilled and ungilled trawler-caught fish.

Days in ice	Fish	Gills in	Gills out
6	haddock	0.30	0.34
9	cod	0.96	1.00
12	cod	8.7	7.6
13	cod	10.8	10.6
14	cod	15.6	30.1

2.6

Menu Prices

In almost two-thirds of the restaurants where fish and shellfish are served the average price of the dinners sold is less than a dollar. Restaurants customarily spend no more than 20 percent of the menu price for the main ingredient. The table on the back of this card lists the percentage of public eating places serving fish and shellfish by menu price of dinners bought most often.

Percentage of Public Eating Places Serving Fish and Shellfish in the United States by Menu Price of Dinners Bought Most Often

	Total		Menu Cost of Dinners						
			Less Than $1	$1-$2	$2-$4	Over $4	More Than One Dining Facility	No Dinners Served	No Answer
	No.	%	%	%	%	%	%	%	%
United States total	208,100	100.0	62.3	21.9	7.1	0.5	0.8	5.4	2.0
Region:									
Northeast	68,000	100.0	62.0	22.1	8.7	0.7	1.0	4.0	1.5
North Central	59,700	100.0	66.5	19.4	5.9	0.2	0.5	4.7	2.8
South	45,900	100.0	67.3	19.1	3.7	0.4	0.4	7.6	1.5
West	34,500	100.0	49.0	29.9	10.7	0.9	1.2	6.3	2.0
Type of Establishment:									
Restaurants	105,700	100.0	85.5	26.5	6.2	0.6	0.2	0.4	0.6
Cafeterias	4,300	100.0	90.7	7.0	-	-	-	2.3	-
Restaurants or cafeterias in hotels	15,300	100.0	13.7	30.7	41.2	2.6	7.2	2.0	2.6
Drug or proprietary stores with fountain	9,800	100.0	81.6	3.1	-	-	2.0	8.2	5.1
Other1/	73,000	100.0	63.8	16.8	2.6	0.1	0.1	13.0	3.6
City Size--Population:									
500,000 or more	42,600	100.0	64.8	18.8	8.7	1.4	1.6	2.1	2.6
100,000 to 499,999	26,100	100.0	71.3	11.5	6.9	0.4	2.3	3.8	3.8
25,000 to 99,999	27,400	100.0	65.0	17.5	6.6	0.7	0.4	9.5	0.3
2,500 to 24,999	39,900	100.0	65.2	24.6	3.5	-	0.2	4.5	2.0
Less than 2,500	72,100	100.0	55.1	27.7	8.5	0.3	0.1	6.8	1.5
Annual Sales:									
$100,000 or more	15,200	100.0	22.4	30.3	37.5	3.9	4.6	1.3	-
$40,000 to $99,999	24,800	100.0	48.8	33.9	11.3	0.8	0.4	3.6	1.2
$10,000 to $39,999	62,600	100.0	68.7	22.8	4.6	0.2	0.3	1.6	1.8
Less than $10,000	91,600	100.0	69.3	17.0	2.6	-	0.5	8.6	2.0
No reply	13,900	100.0	55.4	19.4	7.2	1.4	1.4	8.7	8.5

1/ Includes drinking places, lunch counters, and refreshment stands.

Note: The data are a projection based on the probability sampling of 4,500 public eating places.

3.12 PROBLEMS IN THE USE OF ANTIBIOTICS FOR PRESERVING MEAT AND FISH

Ingram, M. and Barnes, Ella M. (Low Temperature Station for Research in Biochemistry and Biophysics, University of Cambridge, England) and Shewan, J. M. (Torry Research Station, Aberdeen, Scotland)
Food Science Abstracts 28, 121-136 (April 1956)

The possibilities of using antibiotics for preserving meat and fish, and the problems involved, both general and in relation to public health are reviewed, with 64 references.

I. Preservation of meat with antibiotics.--Antibiotics are used extensively in animal feedingstuffs because they accelerate growth and improve efficiency of food conversion. In long-term feeding of antibiotics, the changes in the gut flora are likely to affect the spoilage flora of the meat, but the extent of this is not well defined. There are some indications that a single feed of an antibiotic might be more effective than long-term feeding for eliminating undesirable organisms from the gut of animals. Perfusion of the carcass with the antibiotic just after death has indicated that about 5 ppm. aureomycin will delay internal souring for periods up to 3 days at warm temperatures. Effect over longer periods is problematical since the aureomycin virtually disappeared in 4 to 5 days, even at refrigeration temperatures. Minced meat has been used with antibiotics because it usually carries high bacterial loads and it is easier to get a uniform distribution of the antibiotic. Little has been done to determine the types of bacteria present initially and the changes in the flora during storage with the antibiotic. Tarr and Deas found aureomycin, terramycin, and chloromycetin were the most effective of the various antibiotics tried with minced fish and meat. Aureomycin, in concentrations of 0.5 to 2 micrograms per gram of minced flesh, cause marked inhibition of spoilage; yeasts grew in smaller numbers instead of the bacteria, but they could be inhibited by the addition of rimocidin. Kohler et al. reported that cut-up

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ABSTRACTER: John A. Dassow

3.23 REFRIGERATION OF FISH: PART 4 - PREPARATION, FREEZING AND COLD STORAGE OF FISH, SHELLFISH, AND PRECOOKED FISHERY PRODUCTS

Dassow, John A. (Fishery Technological Laboratory, Seattle, Washington); Pottinger, S. R.; and Holston, John (Fishery Technological Laboratory, East Boston, Massachusetts)
Fishery Leaflet 430, 1-124 (1956)

Section 1--Fish
- Freezing fish at shore plants
  - Groundfishes
  - Salmon
  - Tuna and mackerels
  - Herrings
  - Fresh-water fish
  - Bait and animal food
  - Miscellaneous fish
- Freezing fish at sea
  - Tuna
  - Salmon
  - Trawl fish
  - Factory-ship processing

Section 2--Shellfish
- Oysters
- Shrimp

Figure 14.—A sharp freezer loaded with halibut.

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ABSTRACTER: Kathryn L. Osterhaug

3.17 A STUDY OF THE EFFECTS OF AUREOMYCIN-CONTAINING SEA WATER AND ICES UPON THE STORAGE LIFE OF ROUND HERRING

Tomiyama, Tetuo; Kuroki, Shunichi; Maeda, Denki; Hamada, Seiji; and Honda, Akira (Kyusho University, Fukuoka, Japan)
Food Technology 10, 215-218 (May 1956)

Experimental.--One and one-half tons of Pacific round herring (Etrumeus micropus) weighing 18 to 20 grams each were obtained from the Amakusa Sea. The herring were divided into equal lots and stored in tanks in sea water equal to approximately $\frac{1}{3}$ to $\frac{1}{4}$ the weight of the fish to be stored without and with aureomycin (AM) dissolved in the water as shown in table 1 (see over). The herring on landing were transferred to boxes without or with aureomycin ice or plain ice.

Results.--Storage in sea water containing aureomycin in tanks aboard the boat followed by storage in ice in boxes on shore increased the storage life of herring held at 15° to 21° C. by about 90 percent over the controls. Storage in sea water containing aureomycin in tanks aboard the boat followed by storage in aureomycin ice in boxes on shore increased the storage life of herring held at 1° to 2° C. by at least 40 percent over the controls or about 5 days additional storage.

Conclusions.--The easiest way to extend the keeping quality of herring is to store them in aureomycin-ice after landing if the fishing area is near the landing port. If fishing is conducted far from port, quality will be retained longer if the herring are stored in transit in sea-water containing aureomycin and then boxed with aureomycin ice on shore. Maximum quality retention can be obtained by dipping the herring for 30 minutes in a solution containing aureomycin, storing them in transit in sea-water containing aureomycin, and storing them in boxes with aureomycin ice on shore.

See table, over.

(over)

ABSTRACTER: Martin Heerdt

3.6 FREEZE-DRIED MEAT. II. THE MECHANISM OF OXIDATIVE DETERIORATION OF FREEZE-DRIED BEEF

Tappel, A. L. (Department of Food Technology, University of California, Davis, California)
Food Research 21, 195-206 (March-April 1956)

During the freeze-drying of beef, oxymyoglobin is deoxygenated to myoglobin. During storage and upon subsequent rehydration, the myoglobin in freeze-dried beef is readily oxidized to metmyoglobin. This oxidation of myoglobin is primarily responsible for the early development of an undesirable brown color during storage of freeze-dried beef.

During storage at 38° C., freeze-dried beef will react chemically with relatively large amounts of atmospheric oxygen. This oxidative reaction is not coupled with the main deteriorative reaction of active carbonyl-amine browning. The oxidation of ether-soluble lipids can, at most, account for 10% of the total oxidative reaction. Oxidation of non-ether-soluble conjugated lipids could account for approximately 50% of the total oxygen absorption. The most unusual and most deteriorative oxidative reaction in freeze-dried beef appears to involve the oxidation of the protein fraction. The oxidation of the protein fraction of freeze-dried beef can account for 50-100% of the total oxygen absorbed.

The main oxidative deterioration may be prevented by storing freeze-dried beef in inert atmospheres or at high vacuum. Storage in inert atmospheres at high vacuum does not prevent the oxidation of myoglobin in freeze-dried meat. Conversion of myoglobin to carboxymyoglobin or nitrosomyoglobin gives a stable meat color. Rehydration of freeze-dried beef in oxygenated water is suggested in order to promote the oxygenation of myoglobin and to suppress its oxidative reaction.

See, illustration, over.

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Author's summary

3.17 (Cross Reference: 1.2)

Table 1.--Herring handling treatment

Tank No.	Aboard boat: Holding treatment	Lot	After landing: Iced in boxes with	Storage
1	Sea-water (pH6 to 7) with 10 p.p.m. of AM from a soln. of AM-A and chilled with an ice containing AM. Temp. 1 to 8° C.	a	AM ice*	15 to 20° C.
		b	AM ice	-1 to 2° C.
		c	plain ice	15 to 20° C.
		d	plain ice	-1 to 2° C.
2	Sea-water with 10 p.p.m. of AM from a commercial AM powder and chilled with an ice containing AM. Temp. 3 to 6° C.	e	no ice	15 to 20° C.
		a	AM ice	15 to 20° C.
		b	AM ice	-1 to 2° C.
		c	plain ice	15 to 20° C.
		d	plain ice	-1 to 2° C.
3	Sea water at pH6-7 and with 10 p.p.m. of AM soln. of AM and chilled with plain ice. Temp. 1 to 4° C.	e	no ice	15 to 20° C.
		a	plain ice	15 to 20° C.
		b	plain ice	-1 to 2° C.
		c	no ice	15 to 20° C.
4	Sea-water chilled with plain ice. Temp. 1 to 5° C.	a	AM ice	15 to 20° C.
		b	AM ice	-1 to 2° C.
		c	plain ice	15 to 20° C.
		d	plain ice	-1 to 2° C.
		e	a 30 min. dip in water with 10 p.p.m. of AM and iced with plain ice	15 to 20° C.
		f	same as e but with no ice	15 to 20° C.
		g	no ice	15 to 20° C.

* AM - ice contained 5 p.p.m. of aureomycin.

3.6

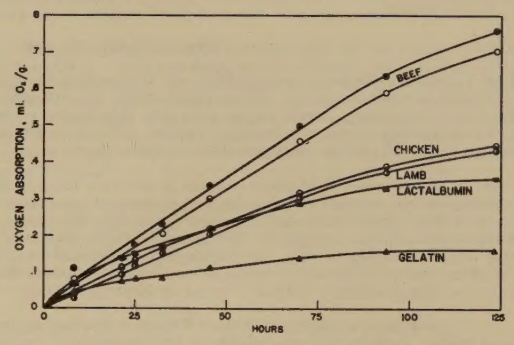

Figure 4. The oxygen absorption of the protein fraction of beef, chicken, and lamb and the proteins, lactalbumin and gelatin.

3.12 (Cross Reference: 3.17)

poultry, dipped in solutions with 3 to 30 ppm. aureomycin, kept longer than controls; 10 ppm. increased the life at 3°C. at least 3-fold.

II. Preservation of fish with antibiotics.--With fish, it is practicable to apply the antibiotics only at the post-mortem stages, and this has been done in 3 main ways: (a) in the form of dips, on board ship, before or after gutting and washing but before stowage below, or on shore, with whole gutted fish or fillets; (b) incorporation of the antibiotic into chilled sea water in which fish are kept; (c) incorporation of the antibiotic into the ice used for chilling fish either on board ship or on shore. Tarr et al.found that coho salmon dipped 1 minute in sea water containing 5 to 10 ppm. aureomycin, kept little better, as judged bacteriologically, than the controls during storage in ice for 13 to 18 days. Lingcod, dipped for the same time in 3 percent brine containing 50 to 100 ppm. aureomycin, gave significantly lower counts than the controls during storage periods up to 10 days in ice. The storage life of salmon, grey cod, and lemon flounder in refrigerated sea water (at -1° to -1.5°C.) with 2 ppm. aureomycin was greater, as judged bacteriologically, than of those stored in ordinary refrigerated sea water. Gillespie et al.and Boyd et al., in a series of experiments using lingcod or salmon, stowed in flake or crushed ice containing 1 to 2 ppm. aureomycin, have claimed very considerable suppression of bacterial spoilage, with a consequent overall extension of storage life of about 5 days. The antibiotic ice was applied immediately and continuously after catching and during the storage period. Even distribution of the antibiotic in large, commercially produced blocks of ice was obtained by adding a colloid, such as carrageen or carboxymethylcellulose, with the antibiotic to the water before freezing.

III. Implications toward public health.--Inasmuch as the quantity of antibiotic ingested in a treated food is far less than a therapeutic dose, it appears that with a suitable choice of antibiotics, the immediate toxicity might not be a serious difficulty, though the effects of continued ingestion require investigation. One of the dangers is that a person may become sensitized to the antibiotic. There are indications that preservation of foods with antibiotics might reduce the incidence of food poisoning. Other considerations are the possibility of destroying the antibiotic in the food, as in cooking, the development of resistant spoilage organisms, the mode of action of the antibiotic, and the necessity of using antibiotic mixtures to inhibit all types of spoilage organisms. The application of legal regulations depend on the existence of convenient, reliable, and accepted methods for quantitative analysis of the antibiotics.

3.23 (Cross Reference: 1.8, 2.118, 3.235, 3.236, 3.237)

Lobster
Crabs
Scallops
Abalone
Clams

Section 3--Raw, Breaded or Precooked Seafoods
- Breaded precooked fish sticks
- Breaded "portion control" fish squares
- Breaded, raw or precooked fillets or bite-size portions of fish
- Breaded, raw or precooked shrimp
- Frozen fish soups or chowders
- Other specialty seafood items
  - Fish pies
  - Abalone steaks
  - Breaded scallops

Fishery Leaflet 430 is available free from the U. S. Fish and Wildlife Service, Department of the Interior, Washington 25, D. C.

3.231 JACKETED-PRINCIPLE COLD-STORAGE ROOM

Anonymous
Commercial Fisheries Review 18, 16-17 (May 1956)

The storage life of frozen fishery products is strongly influenced by the atmospheric conditions within the refrigerated storage room. Fluctuating temperatures and low relative humidities tend to cause excessive dehydration of the products during storage. As a result the fish lose weight and depreciate in quality due to loss of flavor, development of off-odors and loss of appearance.

A refrigerated storage room designed to maintain ideal product environment has great potential for the prevention of weight and quality losses experienced under present cold-storage conditions. The jacketed cold-storage room seems to offer a combination of ideal product environment coupled with practical engineering design. Although this type of cold storage was advocated as far back as 1927, the lack of important data on preservation of product quality and on cost of operation has caused industry to be somewhat reluctant to accept the design.

In order to furnish such data, a cold-storage room employing the jacketed principle has been constructed at the U. S. Fish and Wildlife Service laboratory in East Boston, Massachusetts.

"In this freezer, cold air circulates through an enclosed space or jacket which completely surrounds the room. The outside surface of the jacket is lined with suitable insulation 10 inches thick. The inside surface of the jacket consists of the materials which comprise the walls, floor, and ceiling of the storage room. Vertical and longitudinal wooden members in the jacket are arranged so as to provide ducts which distribute cold air in the proper amounts through various parts of the jacket. The jacket is a closed-duct system containing a set of finned-pipe cooling coils to maintain the air at the

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ABSTRACTER: Kathryn L. Osterhaug

3.237 CONTINUOUS "SHALLOW-FAT" FRYER MINIMIZES FATTY ACID FORMATION

Feldbrugge, Lon
Food Processing 17, 22-23 (October 1956)

To obtain the optimum use of cooking oil during the continuous processing of frozen fried fish sticks, it is necessary that fat breakdown be kept to a minimum.

In a Gloucester, Massachusetts plant breaded frozen fish sticks on a continuous conveyor are fried as they pass, one layer deep, through a shallow-pan fryer. Features of the fryer include low cooking oil capacity, continuous circulation of oil through the system, and recording temperature controls on the furnace burners. All of these contribute toward low fatty acid formation and maximum heat transfer.

The principle of single-layer frying means that only a relatively small amount of fat is used at a time. The shallow-well fryer pan holds 1500 pounds of cooking oil, and the filtering system holds an additional 700 pounds. As the rate of fat pickup by the fish and the total fat content of the system are in balance, the turnover of fat is rapid. Makeup oil is supplied to the fryer automatically.

Because the high-temperature oil flames that supply the frying heat are located below and away from the pan bottom, only the relatively low temperature gases of combustion contact the fryer pan. The bottom of the pan is corrugated lengthwise, to increase the heat transfer surface threefold.

To avoid deposition of carbonized specks on the fish sticks, it is necessary to clarify the hot fat constantly. As the oil circulates, loose breading and crumbs are removed on a crumb conveyor and

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ABSTRACTER: Kathryn L. Osterhaug

3.237 CONTROLLED COOLING: KEY TO QUALITY FISH STICKS

Trauberman, Leonard
Food Engineering 28, 61, 189 (May 1956)

Two continuous, automatic coolers--each of which handles 1500 pounds of fish sticks per hour are part of a complete breading and frying line at a frosted foods plant in New York. The fish (mostly cod) arrives as frozen blocks which are cut into sticks. These are battered, fried and routed to the cooler on a stainless-steel link conveyor. The internal temperature of the sticks as they leave the precooling section of the fryer ranges from 120° to 160° F., depending upon the load. Additional precooling occurs as sticks pass under suction hoods mounted above the infeed conveyor to the cooler. The sticks are at from 110° to 140° F. when they enter the coolers.

Inside the cooler, a mechanical sweep arm gently transfers the sticks from the infeed conveyor to a "dump" conveyor that places them into evenly spaced stainless-steel mesh baskets, figure 1 (see over) These baskets are suspended from chains that move vertically while advancing toward the discharge end of the cooler. In 15 minutes of travel, the sticks are cooled from a range of 110° to 140° F. to one of 60° to 75° F. and the conveyor baskets begin to level off to form a conveyor-packing table as they return to the starting point in the cooler.

The fish stick packing line contains an automatic carton former, which supplies boxes to a belt running above and parallel to the packing table. Fish sticks are hand-packed in two layers of five sticks each, then the carton is automatically closed, coded, and wrapped. Finally, the packages are tray-fed into plate freezers, cased automatically, and stored at 0° F. The cooler unit measures 48 feet long, 5 feet wide, and 8½ feet high and is of stainless structural-steel electrically welded. Cooling is supplied by refrigerated air from two 15-hp. compressors. The air velocity in the cooler is low enough

(over)

ABSTRACTER: Martin Heerdt

6.3 SEAWEEDS - HARVESTING

Schuberth, A.
Deutsche Fischerei Zeitung No. 3, 78 (June 1954)
World Fisheries Abstracts 7, 45 (May-June 1956)

Until now the angle scythe is being used in pond pisciculture to mow down reeds pulling by jerks by hand from the stern of the boat. Trials to mechanize this most tiresome process led to the development of a reed cutting machine, called "Flitzer" using 3 scythes. The machine is used from the bow of the boat and is actuated by a suitable mechanism. In the illustration overleaf, a scythe with accessories as a component part of the reed cutting machine is shown. Two steel blades of about 165 cm. (65 in.) in length are crossed at an angle of 55° to 60° so that the one pair of angle sides reaches back from the intersection of both blade centers about 150 cm. (60 in.). The top edges of the scythes are well sharpened. Both the short sides are united by means of a bolt (3) movable within a guide tube (4) which is welded to a push rod (5) attached to a shaft (7) hinged to the boat. While cruising, for cleaning purposes or when not in use, the scythes can be hoisted by a lever apparatus (9). The scythes may be adjusted vertically by a foot lever and locked by a ratchet click. The clearing helix (12) rotates while cruising and clears the reed from the direction of motion. In the reed cutting machine, Flitzer type, 3 of those component parts are mounted in the bow so that the long sides of the middle scythes overlap the sides of the 2 outer scythes turned towards the middle of the boat. If the equipment is installed in a boat of suitable type and motor, a speed of 2.5 to 3 m./sec. (7.6 to 9.8 ft./sec.) can be reached. Good results were obtained with the equipment in the fish culture pond at Friedrichsmoor, E. Germany.

(over)

ABSTRACTER: W. Partmann

JACKETED COLD-STORAGE

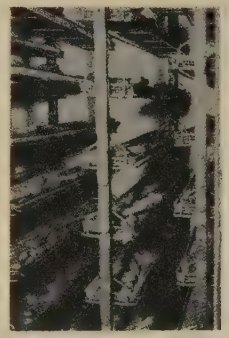
COOLER FOR FISH STICKS

FISH STICK FRYER

SEAWEED MOWER

3.237

to avoid dislodging of the sticks, yet sufficiently high for efficient heat transfer. Air temperature stabilizes at about 40° F. after the initial heat load in the cooler is removed.



WIRE-MESH BASKETS, suspended from vertically moving chains, carry product past 40° F. air to discharge end. Cooling time: 15 minutes.

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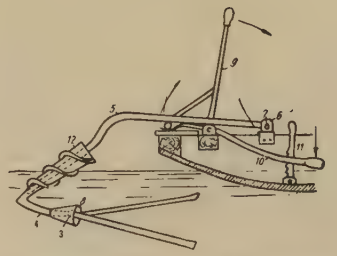

Diagram of scythe with accessories

3.231

proper temperature and two squirrel-cage fans to provide the necessary air circulation. The cold air circulating through the jacket maintains the inner room at predetermined temperatures of 0° to -25° F."

Refrigeration is provided by a two-stage Freon 22 refrigeration system. Doors located on the inner walls of the room may be opened to provide forced air circulation in the room when it is being initially cooled. Dampers are provided to control the air flow in the individual ducts.

By proper air circulation in the jacket, temperature differences as small as 2° F. can be maintained between the temperatures of the jacket walls and the inside room. Owing to this small temperature difference, it is possible to maintain a high relative humidity within the storage area. Because the air in the jacket does not enter the storage room, it cannot draw moisture away from the product. During operation, the moisture contained in the air within the jacket is withdrawn by artificial defrosting; the air in the jacket becomes very dry and thus very little frost accumulates on the cooling coils.

"During preliminary tests a room temperature of -23° F with a maximum variation of only 0.5° F. was obtained by cycling the compressor off a thermostat located in the jacket. Several samples of exposed fish blocks were placed in a conventional-type still-air room at -5° F. and in the jacketed room. Six weeks later the samples stored in the still-air room showed a weight loss of approximately 6 percent, while no appreciable loss in weight occurred in the samples stored in the jacketed room.

More extensive tests will be conducted to determine the effect of storage in this type of room on the storage life of fishery products. Engineering data also will be obtained in regard to the operation of this equipment."

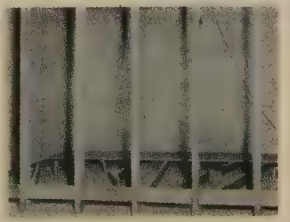

Fig. 1--Arrangement of air ducts in the floor of the jacketed cold-storage room.

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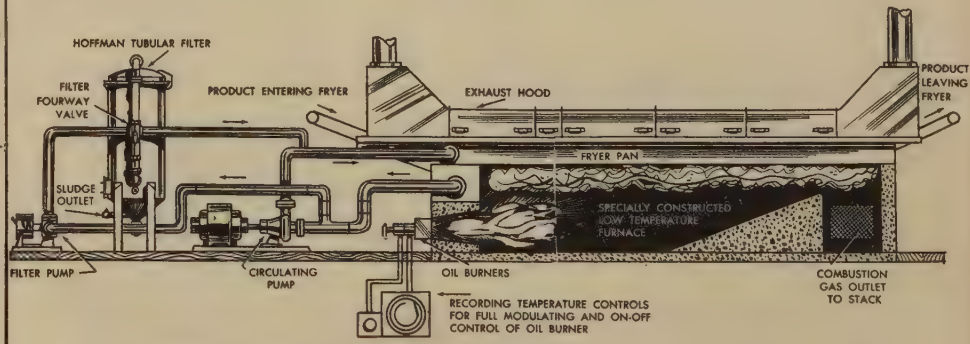

Oil circulates continuously from one end of the fryer pan to the other. Part of circulating stream goes through filter for clarification

part of the oil in the circulating stream is diverted to a filter loop, where the oil is clarified in a tubular filter before it is returned to the fryer.

The unattended fryer produces evenly fried, golden-brown fish sticks without dark-colored specks. Since the fat does not breakdown, shelf life of the product is said to be excellent.

3.249 COLD-STORAGE LIFE OF FRESH-WATER FISH--NO. 2 (YELLOW PERCH, CRAPPIE, WHITE BASS, UTAH CHUB, AND SQUAWFISH)

Osterhaug, Kathryn L. and Miyauchi, David T. (Fishery Technological Laboratory, Seattle, Washington)
Commercial Fisheries Review 17, 19-21 (November 1955)

Data on the cold storage life of fresh-water fish are of value to the fish producer in adopting proper packaging procedures and in evaluating marketing problems as well as to the sport fisherman in preserving his catch. A project to collect information on the cold-storage life of fresh-water fish species was started at the Seattle Technological Laboratory about four years ago. The first report of the findings was published in the September 1954 Commercial Fisheries Review.

The fish used in the present study were collected in Wisconsin, Minnesota, Montana, and Washington. Table 1 (see over) gives the data on four of the lots of fish stored during the past year.

(over)

ABSTRACTER: Kathryn L. Osterhaug

3.61 PRESERVATION OF MEAT BY FREEZE-DRYING

Turner, E. W.
The National Provisioner (Convention Report Issue, NIMPA) 142-144 (May 26, 1956)

Freeze-dehydration is a method of drying in which the frozen product is placed in a high vacuum chamber and dried at a low temperature so that the product remains frozen throughout the drying process.

Ordinary dehydration is an ancient method of food preservation. Freeze-dehydration, on the other hand, is a relatively new process that has been widely used for the preservation of heat sensitive biological materials such as blood plasma, certain biotics, and microorganisms that can be preserved for years in a viable state.

In recent years much effort has been devoted to adapting the freeze-dehydration process to the preservation of meat and other food products. The results of this research effort has been encouraging and the army is now procuring limited quantities of freeze-dried meat for testing purposes.

The commercial possibilities of dehydrated meat have not been explored, but with the current rate of development of the freeze-dehydration process, it may not be too long before dehydrated meat and seafood products will be available for home as well as for military use.

The armed forces are interested in dehydrated foods because these products possess unique characteristics that make them particularly suitable for use under a variety of conditions encountered in military feeding operations. Dehydrated foods, including meat and seafood products, are ideally designed for supply by aerial delivery. They are light in weight and possess high calorie density.

(over)

ABSTRACTER: Kathryn L. Osterhaug

3.33 IRON SULFIDE DISCOLORATION OF TUNA CANS NO. 3--EFFECT OF VARIABLES INTRODUCED BY THE FISH

Pigott, George M. (National Canners Association, Seattle, Washington) and Stansby, M. E. (Fishery Technological Laboratory, Seattle, Washington)
Commercial Fisheries Review 18, 8-12 (June 1956)

The degree of spoilage, the length of time that the fish are held in cold storage, and the species of tuna used are three primary variables of tuna canning that are attributable to the fish itself. The objective of the work reported in this paper was to evaluate the importance of these three variables in the development of iron sulfide on the can area adjacent to the headspace of canned tuna.

Effect of spoilage.--Sulfide content was determined immediately before precooking samples from two groups of albacore tuna. One group had been frozen when fresh; the other, when partly spoiled. The fish in each of these groups was divided into two subgroups, one subgroup being precooked the normal length of time and the other for one-half the normal time. All of the samples were again analyzed for hydrogen sulfide after the meat had cooled and was ready for canning. The results, given in table 1, show that precooking drives the free sulfide from the flesh so that the fish, as it is ready for canning, contains no loosely bound sulfide.

Table 1 - Effect of Precook on Sulfide Content of "Local" Albacore

Sample	Hydrogen Sulfide Content of "Local" Albacore		
	Raw	After ½ Normal Precook	After Normal Precook
	Micrograms Per 100 Gms.	Micrograms Per 100 Gms.	Micrograms Per 100 Gms.
Fresh	16	0	0
Spoiled	26	Trace	0

Raw albacore and yellowfin at different stages of spoilage were precooked and then packed in single-enamel cans. In no instance did spoilage of the raw fish cause worse discoloration than that found with the fresh fish when processed immediately.

(over)

ABSTRACTER: Kathryn L. Osterhaug

7.642 STANDARDIZATION OF ASSAY FOR UNIDENTIFIED GROWTH FACTORS

Barnett, B. D. and Bird, H. R. (University of Wisconsin, Madison)
Poultry Science 35, 705-710 (May 1956)

1. The chick response to sources of unknown growth factors in this laboratory was lost in 1953 after an extended period of good responses.

2. Attempts were made to regain the response by applying stress to the birds in a variety of ways. Testosterone, thyroprotein and cortisone were fed without effect. Raising or lowering the level of protein in the diet or holding the birds without feed and water for extended periods of time did not benefit the chick assay.

3. Feces from older birds reared on built-up litter were fed to chicks for 2 weeks at the rate of 1 percent of the diet. Growth was depressed below controls fed uncontaminated diets. Responses to fish solubles were obtained only in contaminated groups when this procedure was begun. After several such experiments basal growth was not reduced by contamination and responses were obtained without adding feces.

4. Chlortetracycline at the rate of 200 mg./kg. greatly reduced or eliminated the response to 3 or 5 percent fish solubles by depleted or non-depleted chicks.

5. In 3 out of 4 trials depleted chicks responded to a greater degree than did non-depleted chicks.

6. The loss of response in 1953 and its return in 1954 are thought to be due to changes in microbial population of the environment. Certain organisms appear to be necessary for the response to

(over)

Authors' summary

FREEZING FRESH-WATER FISH

SULFIDE DISCOLORATION

FREEZE-DEHYDRATION

ASSAY FOR GROWTH FACTORS

3.33 (Cross Reference: 1.1)

A similar pack was prepared using albacore and yellowfin that had been precooked and held for varying lengths of time at room temperature and at 32° F. As in the case when the raw fish were spoiled, fish spoiled after precooking did not effect can discoloration.

Effect of time in cold storage.--Samples of local albacore showed no signs of causing can discoloration when canned at intervals up to 14 months. After they had been in cold storage for 14 months, however, discoloration was noted when the fish were canned as solid packs.

It was also noted that the albacore that had been spoiled before being frozen and then held for 14 months, caused worse can discoloration than the albacore that had been frozen fresh and stored.

The yellowfin used in these experiments caused some can discoloration when used for solid pack after one month of cold storage. The amount of discoloration caused by yellowfin progressed during storage.

Effect of species.--Only albacore and yellowfin were used for the experimental packs. All imported albacore from Japan caused serious discoloration when packed in single-enamel cans. Yellowfin from the central Pacific also caused discoloration, but less than the imported albacore. Local albacore caused no discoloration until it had been in storage for 14 months. The imported albacore had doubtlessly been in frozen storage for an extended period of time, but the exact storage time was not known.

Conclusions.--1. Essentially all of the free sulfides in the meat of raw tuna, regardless of the degree of freshness of meat, were driven off during the precook.

2. Of the samples used in this work, spoilage either before or after precooking had no effect on discoloration unless the fish were subsequently stored for extended periods in which case the spoiled fish caused somewhat greater discoloration.

3. Increasing the length of time the fish were in cold storage increased the tendency for tuna to cause can discoloration.

4. With the samples of tuna used in this work, the length of time in cold storage had more effect on can discoloration than did the species.

7.642

unknown growth factors. The feeding of antibiotics and maintenance of unusually clean quarters appear to be unfavorable to their propagation.

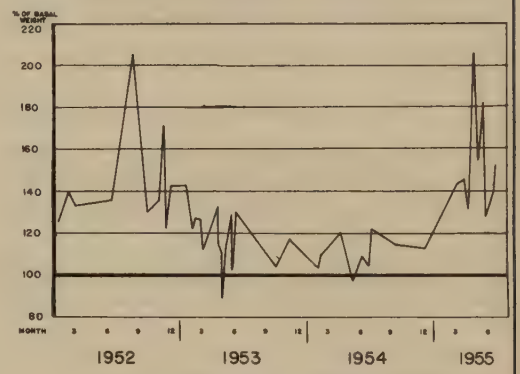

Fig. 1. Change in response to unknown growth factors over a 3½ year period. Data of first 1½ years reported by Bruins, 1953.

3.249 (Cross Reference: 1.92)

Table 1.--Cold-storage life of certain fresh-water fish stored at 0° F.

Description of samples				Condition of samples stored at 0° F. for:			
Name	Source	Date caught	Packaging used for storage	0 months	6 months	9 months	12 months
Yellow perch *Perca flavescens*	Lake Winnebago, Wisconsin	July 1953	In the round, packed in polyethylene bags	Mild flavor; tender; slightly dry after cooking (good)	Quality unchanged (good)	Quality unchanged (good)	Quality unchanged (good)
Crappie *Pomoxis annularis*	Two Rivers Lake, Benton County, Minnesota	Oct. 1953	In the round, ice-glazed, packed in polyethylene bags	Meat white; tender, firm, and flaky; flavor bland but pleasant (excellent)	Some off-flavor in belly flaps; otherwise good	No further change (good)	Discontinued
White bass *Lepibema chrysops*	Lake Winnebago, Wisconsin	July 1953	In the round, packed in polyethylene bags	Appearance good; texture firm, tender, and moist. Flavor mild and sweet (excellent)	Some off-flavor in belly flaps; otherwise good	Some discoloration and off-flavor in belly flaps; otherwise good	Same as at 9 months
			In the round, packed in quart jars, flooded with tap water	Same as above	Same as above	Same as above	Same as above
			Dressed fish, packed in quart jars, flooded with tap water	Same as above	Same as above	Same as above	Same as above
Utah chub *Gila atraria*	Hebgen Lake, Montana	July 1953	In the round, ice-glazed, packed in polyethylene bags	White meat extremely soft with many small bones; good flavor (acceptable)	White meat flat; dark meat extremely strong flavor	No further change	No further change
			Dressed fish, glazed, packed in polyethylene	Same as above	Same as above	Discontinued	

3.61

Freeze-dehydrated meat possesses a very good eating quality when it is properly rehydrated and prepared. The texture and flavor are nearly equivalent to fresh meat and much better than canned sterilized products. Freeze-dehydrated meat is very stable and when properly packaged can be stored several years without refrigeration.

The freeze-dehydration process is carried out in a vacuum chamber that is constructed to withstand low positive pressures of the order of ½ to 1½ m.m. of mercury. Shelves that are heated by the circulation of a liquid medium and designed to serve as plate type heat exchangers, are arranged within the vacuum chamber and used to hold the frozen products during dehydration. Although the product remains frozen during the drying process, a certain amount of heat is required to supply sufficient energy for sublimation of the water in the tissues. Rapid sublimation of water vapor cools the product and keeps it frozen.

The high vacuum used in the process is necessary to remove the water vapor away from the surface of the product and to pump it out of the system as fast as it is formed.

The entire freeze-dehydration process takes from about 12 to 24 hours, depending upon the plate temperature used and whether a cooked or a raw product is being dehydrated.

3.63 HEAT AND WATER TRANSFER DURING THE DEHYDRATION OF HERRING FILLETS

Del Campo, M. M. and Cutting, C. L. (Humber Laboratory, Hull, England)
Journal of the Science of Food and Agriculture 7, 417-424 (June 1956)

To make possible a more economic exploitation of herring resources than is permitted by the manufacture of fish meal and oil, the authors have endeavored to preserve herring fillets by a dehydration process and to obtain a palatable product that would be reconstituted easily and that would provide a means of meeting the protein deficiency so common in underdeveloped countries. Primitive methods of drying and smoking are commonly used in many parts of the world, and the authors felt that it might be economically possible, by large-scale mechanical methods, to produce a smoked dried herring for export.

Preliminary experiments had shown that, although whole herrings could be hot smoked and dried to produce a commodity similar to "bonga", the drying process, which took several days as compared with a few hours for cooked mince, was likely to be too lengthy for commercial purposes when the fresh fish contained more than about 5 percent of fat. Because microbiological activity continues in dehydrated fish, unless the moisture content is less than 10 percent, thorough drying was essential. It was found that the removal of the last 20 to 30 percent of the moisture required about half the total drying time.

This paper presents the results of experiments on the effect, on the rate of drying of herring fillets in an 'over-draught' truck and tray dryer, of such variables as temperature, relative humidity, air velocity, size and fat content of fillets, and arrangement of fillets. The effect of smoke was not investigated, but the smoke would not be likely to affect the rate of drying. No systematic attempt was

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 ABSTRACTER: F. Bruce Sanford

4.21 A CHEMICAL STUDY OF THE OIL OF SALMON IN COLD STORAGE

Brocklesby, H. N.
Biological Board of Canada, Manuscript Reports of the Experimental Stations, (1929) (Prince Rupert, B. C.)

The investigations reported were undertaken in connection with studies of changes that occur in fish placed in cold storage. Iodine values, saponification values, and acid values were determined on oils from salmon of the genus Oncorhynchus and steelhead of the genus Salmo.

Each sample was prepared by extracting the oil from the great pink muscle, the dark muscle and the skin by the use of a pressure cooker and a carver press. The oils were dehydrated with anhydrous Na_2SO_4 and filtered.

In experiment 1, samples were obtained from fish in all stages from the strictly fresh to the badly "rusted" condition. Acid values, iodine values, insoluble bromide and saponification values were attained for the majority of the samples. The results of this analysis are presented in tabular form.

In experiment 2, fresh red spring salmon were used. Three of these fish were analyzed while in the fresh condition. One of the three was fresh frozen whereas the other two were simply chilled. The remaining fish used in this experiment were air frozen at -20° F. One-half of them were glazed, the other half unglazed. They were placed in four cold storage rooms, each room was maintained at a different temperature and had a different rate of temperature change. In each of the four rooms, both glazed and unglazed samples were stored. These samples were analyzed, for the most part, after seven and twelve months, respectively. Acid values, iodine values and saponification values

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 ABSTRACTER: Donald Malins

4.11 PARTITION CHROMATOGRAPHY OF ALIPHATIC ACIDS QUANTITATIVE RESOLUTION OF NORMAL CHAIN EVEN ACIDS FROM C_{12} TO C_{24}

Vandenheuvel, F. A. and Vatcher, D. R. (Fisheries Research Board of Canada, Halifax, Nova Scotia)
Analytical Chemistry 28, 838-845 (May 1956)

"Reversed-phase chromatography on a dichlorodimethylsilane-treated silicic acid column, with 2, 2, 4-trimethylpentane (isooctane) as stationary phase and aqueous methanol as eluting solvent, allows the quantitative resolution of mixtures of even-numbered, normal-chain saturated fatty acids in the range C_{12} to C_{24}. Less than 50 milligrams of mixed acids are needed. The elution and titration of the seven acids require about five hours. Individual components representing 10 percent or more of the mixture are determined with an error not exceeding 2.5 percent. An almost comparable degree of accuracy is attainable for minor components (1 to 3 percent of the total mixture), when a procedure involving a complementary analysis is followed. A device for automatically and continuously changing the composition of the eluting solvent and a semiautomatic, motor-driven microluret are described. The method is applicable to the determination of the relative proportion of each carbon series represented in a fat sample and the relative proportion of saturated to unsaturated acids in each carbon series."

The authors state that an error of 20 percent is apt to be reached for a single determination of minor components, owing to small systematic errors which bear heavily on the results obtained for minor components. The degree of precision can be increased by preparing and analysing a synthetic mixture, made to represent the composition found for the unknown. The results can then be used to correct the previous ones. Experience has shown that the correction applied should be not the whole difference between unknown and synthetic compositions found but only half that difference.

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 ABSTRACTER: E. H. Gruger, Jr.

7.80 SOME ASPECTS OF NUMERICAL SCORING IN SUBJECTIVE EVALUATION OF FOODS

Carlin, Agnes Frances; Kempthorne, Oscar; and Gordon, Joan (Iowa Agricultural Experiment Station, Ames, Iowa)
Food Research 21, 273-281 (May-June 1956)

The aim of the investigation described was to obtain some basic information on the effectiveness of different scales of numerical scoring in subjective evaluation of foods. With a view to obtaining extremes which might shed light on the matter, scales of 0-5, 0-10, and 0-100 were used on reconstituted orange juice with 3 levels of added sugar. It was found that essentially the mean score over a group of judges was related linearly between scales, so that the population of judges could be assumed to be measuring the same attribute or combination of attributes on the different scales. Therefore, the scales were compared according to: a, coefficient of variation; b, standard deviation within judges; and c, sensitivity. The general conclusion is that the 0-100 scale is at least as good as the 0-5 scale and in some cases was better. The 0-10 scale was better than the 0-5 scale. The 0-10 and the 0-100 scales were not compared with the same group of judges so that no choice between these is indicated.

A further aim was to study the effects of order of presentation of samples. The 6 possible orders of presentation of the 3 levels of added sugar were compared in latin squares. It was found that the mean score given to the intermediate level of added sugar samples was affected by the order of presentation.

A third aspect examined was the extent to which comparisons between a number of samples can be made in pairs for 3 samples, A, B & C, with the 3 possible paired tests of A & B, A & C, and B &

(over)

 Authors' summary

DEHYDRATED HERRING

REVERSED-PHASE CHROMATOGRAPHY

CHEMISTRY OF SALMON OIL

ASPECTS OF NUMERICAL SCORING

4.11

The results shown in table 3 were obtained by performing the analyses in a room where the temperature was automatically maintained at 25° ± 1° C.

Table 3. Results from Mixture B[a] and Mixture C[b]

	Mixture B					
	Run 1		Run 2		Mixture C	
Acids	Found, mg.	Composition, %	Found, mg.	Composition, %	Found, mg.	Composition, %
C_{12}	0.94	2.0	0.94	2.0	0.74	1.6
C_{14}	13.23	28.2	13.12	28.2	13.00	28.0
C_{16}	27.82	59.0	27.68	59.4	27.82	59.9
C_{18}	3.63	7.7	3.63	7.8	3.63	7.8
C_{20}	1.46	3.1	1.24	2.6	1.25	2.7
C_{22}	0	0	0	0	0	0
C_{24}	0	0	0	0	0	0
Total	47.08	100.0	46.61	100.0	46.44	100.0

[a] Mixture of saturated acids from herring oil
[b] Synthetic mixture made to represent composition found for mixture B.

7.80

C. The results indicated that the difference for A vs. C was essentially equal to the sum of the differences of A vs. B and B vs. C. On this evidence, then, scoring by paired tests gives consistent results.

TABLE 1
Mean scores for samples containing varying amounts of sugar

Level of added sugar	Experiment	Mean score expressed as percentage of standard		
		0-100 scale	0-5 scale	0-10 scale
0	Spring '52	94.6	86.0	
	Spring '52	91.4	88.6	
	Fall '52	97.7	96.0	
	Fall '52	96.7	93.8	
	Spring '53		95.8	98.7
	Mean	95.1	92.1	
2%	Spring '52	78.2	62.4	
	Spring '52	78.3	68.6	
	Fall '52	84.7	77.6	
	Fall '52	85.4	71.4	
	Spring '53	.	78.2	76.0
	Mean	81.7	71.6	
5%	Spring '52	51.7	37.6	
	Spring '52	52.4	35.6	
	Fall '52	62.0	41.6	
	Fall '52	61.1	38.0	
	Spring '53	. . .	38.2	43.3
	Mean	56.8	38.0	

3.63 (Cross Reference: 1.2)

made to assess the palatability or storage properties of the product, and no detailed consideration was given to problems of packaging the product or to economic aspects of the drying process.

The rate of drying of herring fillets in the over-draught dryer was very sensitive to temperature but was practically unaffected by normal ranges of wet-bulb depression and of air velocity. Fatty herrings took longer to dry than did lean ones, and considerable oxidation of fat occurred during the process. Variation of thickness, within the range usually encountered, was of some importance.

The storage life of fillets, which depends very much on taste, was limited chiefly by (1) the oxidation of the fat, which could be prevented by packing the fillets in an inert gas, and (2) the development of moulds, which occurred unless the moisture content was below about 16 percent. It was found from a determination of equilibrium moisture contents at a number of relative humidities that this corresponded to about 70 to 75 percent relative humidity. It was thought that the best products, if suitably packaged, could be kept in tropical regions for several months under the prevailing climatic conditions.

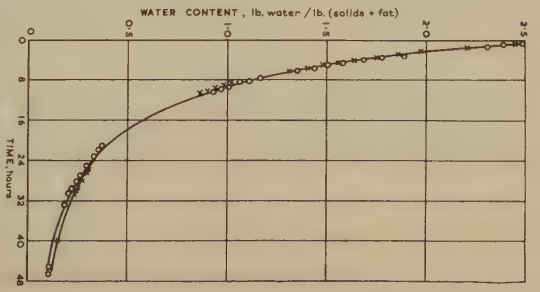

Fig. 2. --Effect of wet bulb depression on the drying of herring fillets

× Dry bulb 120° F; air speed 12 ft./sec. W.B.D. 30° F; R.H. 30%

○ Dry bulb 120° F; air speed 12 ft./sec. W.B.D. 40° F.; R. H. 15%

4.21 (Cross Reference: 1.30)

were determined and are tabulated.

In experiment 3, fresh humpback (pink) salmon and fresh red spring were employed. Each sample was stored in the same storage room for the same length of time. All samples were air frozen and glazed. Half of them were frozen in the round whereas the other half were eviscerated before being frozen. Samples of each were maintained in sealed tin boxes in an environment of O_2, CO_2 and NH_3 respectively. Controls were kept in the ordinary atmosphere of storage rooms. The acid value and refractive index was attained for each sample. The results are tabulated.

It was found that oils from the fresh fish were neutral as illustrated by their acid values. Out of forty-four samples examined, forty samples showed a higher acid value for the oil from the pink muscle than from the skin and dark muscle. It was concluded that hydrolysis of the oil proceeds more rapidly in the interior of the fish than it does towards the outside.

It was concluded that as a general principle the longer the fish is stored, the higher the acid value. Samples stored in the NH_3 environment gave the lowest acid values. The statement that the amount of "rusting" can be estimated by the acid value of the oil was not substantiated.

Little information was attained from the iodine values due to biological variations within the species.

In general, the degree of unsaturation of the oil from the inner pink muscle seemed to be higher than that of the oil from the dark muscle and skin. This was true of fresh as well as of stored fish so that oxidation during spoilage could not be the controlling factor.

4.60 ANTIOXIDANTS - PRESENT STATUS

Couch, J. R. (Texas A & M College)
Feedstuffs 28, 32-34 (May 19, 1956)

Antioxidants were first introduced to the feed trade at the American Feed Manufactures Association annual meeting on May 5-7, 1954, by E. P. Singsen of the University of Connecticut. Singsen reported that crazy chick disease or encephalomalacia could be prevented by vitamin E and that diphenyl-para-phenylenediamine (DPPD) was very effective in preventing the disease. Within 3 to 4 months after Singsen's report, DPPD was accepted for use in poultry feeds only, and by December of 1954 DPPD was being widely used as an antioxidant in manufactured feeds.

Feedstuffs vol. 28, April 14, 1956, reported that the Food and Drug Administration had recommended the withdrawal of DPPD from feed trade channels. DPPD was not indicative of producing any harmful effects when incorporated in poultry feeds, but DPPD did produce a toxic effect when fed to pregnant rats. For this reason the Food and Drug Administration recommended stopping the distribution of DPPD to the feed industry for use in poultry feeds and recalling stocks of DPPD in distribution channels.

Work at the University of Connecticut showed that butylated hydroxytoluene (BHT) was equal to DPPD for preventing the occurrence of crazy chick disease. BHT also was as effective as DPPD in promoting the storage of vitamin A in the liver when used at a level of 0.0125 percent or $\frac{1}{4}$ pound per ton of mixed feed.

BHT as well as a number of other antioxidants were accepted by the Association of American Feed Control officials at their annual meeting in Washington, D. C. on October 12-14, 1955. On April 27,

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 ABSTRACTER: Martin Heerdt

6.14 A NEW DEVELOPMENT IN FISH MEAL PROCESSING

Meade, T. L. (New Jersey Menhaden Products, Inc., Wildwood, N. J.)
Feedstuffs 28, 14, 16, 121-122 (May 19, 1956)

Menhaden fish meal is cured immediately after it comes from the dryer. This means that the scrap, as the dried meal is called upon being discharged from the dryer, is blended and allowed to cure or age in piles until its moisture content becomes equalized. During curing the meal becomes quite hot, and its temperature may rise to the point of combustion, therefore the piles are turned at intervals to control the curing process and prevent overheating, which may seriously impair the nutritive quality of the meal. The primary reaction involved in curing is an autoxidation of the residual unsaturated oil.

Antioxidant studies.--Storage studies were carried out during 1954 with one-ton piles of menhaden scrap with and without added antioxidant. The pile which served as a control, received no antioxidant, the other pile received 3 pounds of diphenyl-p-phenylenediamine (DPPD) which was carefully blended in with the scrap. The piles were not turned until after 24 hours of curing. The temperatures of the control pile were, after 1, 4, 8, 24, and 30 hours, respectively, 95°, 122°, 148°, 190°, and 160° F. The temperatures of the experimental pile with DPPD were, 1, 4, 8, 24, and 30 hours, respectively, 90°, 93°, 96°, 110°, and 92° F. When the DPPD treated scrap was ground into meal 5 days after the onset of curing there was no increase in temperature to indicate further oxidation.

In storage studies made during 1955, the amount of DPPD added was reduced to as little as $\frac{1}{2}$ pound of DPPD per ton of scrap, and results similar to the 1954 results were obtained with small experimental piles of menhaden scrap. When DPPD was added to either the press cake before it was dried or the scrap after it was dried and the scrap was held in large piles that represented normal

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 ABSTRACTER: Martin Heerdt

4.92 STUDIES ON THE NUTRITIVE VALUE OF MARINE ANIMAL OILS

Kaneda, Takashi; Sakai, Hisae; Ishii, Seinosuke; and Arai, Kimie (Tokai Regional Fisheries Research Laboratory, Tokyo, Japan)
Bulletin of Tokai Regional Fisheries Research Laboratory, No. 12, 72-73 (December 1955)

In marine animal oils the term "nutritive value" may be used to express the overall calorific value, the value of essential fatty acids, the content of fat-soluble vitamins, and the calorific value of, or the presence of toxicity in the unsaponifiable matter. The present study is concerned with the calorific value of lipides in the hope that it might be possible to process marine animal oils into edible oils. A second aspect of this study is concerned with the toxicity of shark liver oils.

Feeding experiments.--A sample of non-autoxidized, highly unsaturated fatty acids extracted from sardine oil was administered to rats. These rats, gained weight almost as fast as did controlled rats fed with oleic acid. A third group of the rats that had received a diet containing similar highly unsaturated acids autoxidized by atmospheric oxygen, however, lost considerable weight and finally died. On the basis of these findings, the authors concluded that the highly unsaturated fatty acids in fresh fish are not detrimental to the health of animals.

Application of findings.--To learn if these findings are applicable to other natural unsaturated fatty acids as well, the authors conducted a similar feeding experiment, using the ethyl ester of liquid acids of linseed oil. The results obtained were identical with those obtained in the preceeding test.

Toxic structure.--To determine the kinds of materials that are most toxic, the authors separated toxic products from non-toxic products by solvent extraction, chromatography, use of urea complexes, and other means. Animal-feeding tests indicated that the fraction that did not produce an urea adduct

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 ABSTRACTER: Martin Heerdt

8.59 THE PRESENT STATE OF KNOWLEDGE OF FISH PHOSPHOLIPIDS

Lovern, J. A.
Chemistry and Industry 20, 422-423 (May 26, 1956)

The phospholipids of fish have not received as much study as those of mammals and, in many cases, the author's main interest has been the accompanying and predominating triglycerides. Usually the phospholipids have been examined without further subdivision. Extraction techniques have often been inadequate to deal with "bound" phospholipids, the phospholipids isolated have often been very impure; and when they have been further fractionated the separation procedures have generally been unsatisfactory. These factors probably account for the widely varying contents of phospholipids reported for fish tissues. Detailed studies with cod and haddock have shown that the flesh contains about 0.35% of phospholipids. Lecithin accounts for some 70% of these and part of it is unusual in being quite soluble in acetone. The soluble lecithin has a remarkable fatty acid composition, 60-70% of the total being C_{20} and C_{22} derivatives of particularly high unsaturation. There are minor proportions of phosphatidyl-ethanolamine, acetal phosphatides and probably sphingomyelin, but no phosphatidyl-serine. There are also small proportions of at least two, and probably three, inositol-containing lipids, probably phosphatides. Both species contain appreciable proportions of what seem to be novel phospholipids. One of these is also apparently more firmly "bound" in the tissue than for instance, lecithin. Both of them appear to be based not on glycerophosphoric acid but rather on some polyglycerol phosphate, and to have a fatty acid: glycerol: phosphate ratio of about 4:2:1. They contain nitrogen, but this has not so far been characterized or proved to be an integral part of the phospholipid structure. One of these phospholipids is remarkable for a fish lipid in that its fatty acids contain about 18% of stearic acid.

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ANTIOXIDANTS FOR MIXED FEEDS

TOXICITY OF MARINE OILS

ANTIOXIDANTS FOR FISH MEAL

FISH PHOSPHOLIPIDS

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was the most toxic. To learn if the toxic effects could be attributable mainly to the presence of peroxide-structure, the authors eliminated the peroxide from autoxidized products by Lea's method for the determination of peroxide method. The peroxide-free products were found to be non-toxic. The same result was obtained with peroxide-free products of autoxidized highly unsaturated fatty acids. The authors concluded, therefore, that the most toxic structure in autoxidized unsaturated acids is a peroxide produced at the beginning of the autoxidation.

Experiments with saury oil.--In another feeding experiment the oil from salted and dried saury (peroxide value 65) was found to have a toxic effect, whereas the oil from dried herring (peroxide value 14) had only favorable effects on the growth of rats. From these findings the authors concluded that the nutritive value of oils of salted-dried fish is influenced by the degree of autoxidation and that if the original oil shows a high iodine number, the nutritive value of the oil decreases when it becomes autoxidized.

Value of liver oil.--Liver oils from angel shark, ground shark, dogfish, goblin shark, sting ray, and thresher shark were quite superior in nutritive value for rat growth to liver oils from Etmopterus sp. and hammerhead shark. Squalene that had been fed to rats could be recovered in their hair, skin, muscle, and intestine.

Rats that received oleyl oleate, cetyl oleate, oleyl stearate, octadecyl oleate, or the partially hydrogenated product of oleyl oleate in their diets developed seborrhea. The lipids of the viscera and muscle of rats fed with oleyl oleate had a low saponification number and contained considerable unsaponifiable matter. The oleyl oleate, therefore, is presumed to have been deposited "as is" in the tissue and to have caused seborrhea.

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4.60 (Cross Reference: 4.62, 4.63)

1956, the Food and Drug Administration stated that butylated hydroxyanisole and butylated hydroxytoluene were acceptable for use in foods and that the acceptable concentration could vary from 0.01 to 0.02 percent.

BHT now appears to be the antioxidant of choice. Both BHT, which would be used as a direct feed additive, and BHA, which is used as an antioxidant in fats that are later used as an ingredient in mixed feeds, are generally acceptable to the trade. Both of these antioxidants are also acceptable for use in human food according to the Food and Drug Administration, therefore carryover of these antioxidants into poultry and meat for human food need be of no concern to the nutritionist.

6.14 (Cross Reference: 4.62)

production, the author found no significant reduction of temperature. The induction time before heating occurs, however, did increase.

To determine if DPPD would control oxidation under conditions whereby heat could be dissipated more effectively, DPPD was added at the rate of one pound per ton of scrap, and the scrap was cooled rapidly after discharge from the dryer. Scrap temperature did not increase, and the meal prepared from this scrap showed no evidence of oxidative deterioration even after 6 months of storage. Similar results were obtained with scrap prepared from simultaneously dehydrated press cake and condensed fish solubles. Equivalent results were obtained with butylated hydroxytoluene in place of DPPD after DPPD was withdrawn by the Food and Drug Administration.

When analyzed chemically, DPPD treated scrap and meals invariably contained 1 to 2 percent more extractable oil by either acetone or ether extraction methods. As a check on protein quality day-old cockerel chicks were fed a supplemented corn, soybean oil meal, and peanut meal ration adjusted to provide a 20-percent protein level when 8 percent of the menhaden meal under test was added. The results of the feeding trials show that scrap pile curing in this instance reduced the quality of the menhaden meal. When samples of the menhaden meals fed were digested with pepsin, to determine their digestible protein values, the scrap-pile cured meal contained 79.8 percent protein, the experimental meal contained 85 percent protein, and the DPPD treated meal contained 91.3 percent protein.

6.19 FISH MEAL IN RATION UPS LAYER'S OUTPUT

Runnels, Thomas (University of Delaware)
Flour and Feed 57, 18-19 (May 1956)

Income from poultry.--United States Department of Agriculture reports show that the gross annual income in the United States from poultry and poultry products is approximately 4 billion dollars. This income is derived primarily from eggs, farm chickens, commercial broilers, and turkeys. Ducks, geese, pheasants, and game birds also contribute a small share of this total.

Availability of fish meal.--According to the American Feed Manufacturers Association predictions, the poultry population of the United States will consume approximately 29 million tons of feed in 1956. Of this total approximately 20 million tons will consist of commercial poultry mash. If this mash were fortified with 5 percent fish meal the fishing industry would have to provide 1 million tons of meal. Actually one million tons of fish meal is more than twice the actual domestic and import tonnage available. By comparing the tonnage of fish products available with the amount of poultry mash fed each year, it is apparent that 40 pounds of fish meal is available for use in each ton of poultry mash, or an amount equal to only 2 percent of the diet.

Fish meal in the diet.--Research has demonstrated that the inclusion of 2.5 to 5.0 percent fish products (meal or solubles) in the diet of laying hens, broilers, and turkeys causes hens to lay more eggs; eggs from breeder flocks to have a higher percentage hatch of vigorous chicks; and broilers and turkeys to grow more rapidly. Reasons for the biological values obtained from fish products are to be found in their vitamin and growth factor content and liberal amounts of essential amino acids. Chemical analysis shows that an average sample of fish meal contains 60 percent protein, 9 percent fat, and 22 percent bone. Analyses, however, do not reveal why fish products produce the superior results

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 ABSTRACTER: Martin Heerdt

6.15 PREPARATION OF A DRY PRODUCT FROM CONDENSED MENHADEN SOLUBLES

Lee, C. F. (Fishery Technological Laboratory, College Park, Maryland)
Research Report 45, 33 pp., U. S. Department of the Interior, Fish and Wildlife Service (1956)

A stable, free-flowing dried soluble could be included in mixed farm-animal feeds by many manufacturers who do not have the equipment to use the condensed solubles containing 50-percent solids. Dried solubles were prepared by means of a small drum dryer from 32 samples of typical condensed menhaden solubles obtained from plants along the coasts of the Middle and South Atlantic and the Gulf of Mexico. About three-fifths of all the samples tested were readily dried and gave dry products that would be satisfactory if handled and packaged so as to prevent absorption of atmospheric moisture.

A number of chemical and physical properties were determined both for the condensed solubles and for the resultant dry products. Ten properties, or drying characteristics, for the solubles or the dried product were used to calculate a "Suitability Factor" that would permit estimating the value of a particular sample of condensed solubles to produce a satisfactory dry product. The correlation of certain properties of the condensed solubles to characteristics of the related dry products will be presented in a later report.

Improvements in certain drying characteristics were obtained with some difficult-to-dry samples of condensed solubles by the use of small amounts of additives. However, when added in amounts of 10 percent or less, none of the additives entirely prevented such features as excessive hygroscopicity, hot-plasticity, oil separation, and drum adhesion, which result in an unsatisfactory dry product.

The preparation of a dry product by drum-drying random lots of condensed menhaden solubles

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 ABSTRACTER: C. F. Lee

6.193 GROWTH-PROMOTING ACTIVITY OF ASH WHEN FED IN PRACTICAL DIETS TO CHICKS

Camp, A. A.; Reid, B. L.; and Couch, J. R. (Texas A & M College System, College Station, Texas)
Poultry Science 35, 621-627 (May 1956)

Objective.--A study was made to determine the growth-promoting activity of the ash obtained from fish solubles, dried whey, and distillers dried solubles when added to a practical chick diet under field conditions.

Experimental.--In each of two experiments, 100 (Red Cornish X New Hampshire) sexed chicks (50 males and 50 females) were placed in each of a number of experimental groups. All chicks were vaccinated for Newcastle disease 24 hours after hatching, debeaked, housed on peanut hull litter in a multiple-unit brooder house equipped with butane brooders, and provided with food and water ad libitum. Feed consumption, mortality, and weight were recorded.

The basal diet for experiment 1 had the following percentage composition: ground milo 31.5, ground yellow corn 30.0, soybean oil meal 33.5, alfalfa leaf meal 2.5, ground limestone 1.5, and steamed bonemeal 2.0. To each pound of the diet was added 2 milligrams (mg.) riboflavin, 5 mg. D-calcium pantothenate, 12.5 mg. niacin, 400 mg. choline chloride, 650 International Chick Units vitamin D_3, 2270 International Units vitamin A, 3 micrograms vitamin B_{12}, 5 mg. aureomycin HCl, 2 mg. procaine penicillin, 5 mg. bacitracin, 100 mg. $MnSO_4$, and 0.10 percent Megasul (25 percent). The basal diet for experiment 2 varied somewhat from the above diet.

Ashed products fed as supplements to the basal diet in the first experiment were ignited in an open flame and ashed in a muffle furnace at 600° C. to constant weight. Fish solubles, dried whey, and distillers dried solubles yielded, respectively, 8.64, 15.71, and 8.01 percent ash. A reconstituted ash

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 ABSTRACTER: Martin Heerdt

7.51 SHORT METHOD OF DETERMINING BIOLOGIC VALUE OF PROTEINS

Anonymous
Nutrition Review 14, 215-216 (July 1956)

The standard procedure for evaluating the biologic value of proteins has involved a nitrogen balance study with rats for which a large number of Kjeldahl determinations are required. D. S. Miller and A. E. Bender (Brit. J. Nutrition 9, 382 (1955)) have proposed a shortened procedure whereby the protein in the food is the only thing on which a Kjeldahl analysis must be made. The retention of the dietary protein in the body of the rat is determined indirectly from the moisture content of the animal's body. The relationship of moisture to protein has been expressed by an equation which makes allowance for the slight changes in the ratio of moisture to protein with the age of the rats.

By the above method the biologic value of seven proteins can be determined in ten days with 32 rats. In the same way the limiting amino acid in a protein can be determined by supplementing the protein with triads of nine essential amino acids. The procedure, which is applicable to many investigations, is best described by the results of the studies of these workers with casein. Six groups of rats received the casein diet supplemented with three different amino acids; another group received the basal casein diet. The biologic value of casein was found to be 60; the values for the amino acid supplemented groups were (read down and across for biologic value of combinations of these amino acids):

Histidine	Lysine	Tryptophan	61
Methionine	Threonine	Leucine	84
Valine	Isoleucine	Phenylalanine	60
80	60	61	

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FISH MEAL IN POULTRY RATIONS

CHICK GROWTH FACTOR IN ASH

DRYING MENHADEN SOLUBLES

ASSAY OF PROTEIN VALUE

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fed as supplements to the basal diet in the second experiment was based on a spectrographic analysis of fish solubles and of dried whey and prepared from reagent grade chemicals. At 0.35 percent of the diet, the reconstituted ash supplied the mineral elements present in 1.5 percent fish solubles and 1.5 percent dried whey.

Results.--Inorganic constituents obtained from fish solubles or distillers dried solubles by ashing produced a highly significant increase in growth equal, respectively, to approximately one-half of the growth obtained with fish solubles and all of the growth obtained with distillers dried solubles. Results obtained also confirm earlier reports of increased chick growth from chicks on an all-vegetable protein diet supplemented with fish solubles, dried whey, and distillers dried solubles. Fish solubles and dried whey in combination stimulated chick growth to a significantly greater extent than did either supplement alone.

A mineral mixture or reconstituted ash, which simulated the composition of a 1 to 1 mixture of dried whey ash and fish solubles ash when fed as a supplement to the basal diet, produced a highly significant increase in the growth of chicks to 10 weeks of age. The need for further study of the minerals essential for poultry is indicated from the growth responses obtained with the inorganic constituents from fish solubles, dried whey, and distillers dried solubles.

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Since the only improvement occurred in the two groups receiving methionine in the supplement, it was apparent that methionine was the primary limiting amino acid in the casein.

The suggestion that the the biologic value of a protein could be determined by the increase in the nitrogen content of rats as determined by the body moisture content was made a few years ago (A. E. Bender and D. S. Miller, Biochem. J. 53, vii (1953)).

On the basis of the above notes, R. M. Forbes and M. Yohe (J. Nutrition 55, 493 (1955)) compared the procedure with the Thomas-Mitchell nitrogen balance method. Both the moisture content and the nitrogen content determined by the Kjeldahl technic gave values for the net protein of blood fibrin which agreed very well with the results of the Thomas-Mitchell method. This was true for the groups that had been kept on a stock or other good ration prior to the test. Discrepancies occurred when the rats were maintained on a low protein ration for a week prior to the test. The latter was a deviation not included in the Miller-Bender proposal.

The agreement of the results for the biologic value of proteins determined by this short method with those measured by the more time-consuming nitrogen balance study should permit a wider use of this procedure. As the method is used more frequently, it will be possible to evaluate it with the same thoroughness as has been applied to the longer Thomas-Mitchell procedure.

6.19

that are revealed by biological or feeding comparison tests.

Growth factor research.--That unidentified growth factors are present in fish, milk, meat, fermentation products, and green plant products has been known for many years. The identification and isolation of vitamin B_{12} in 1948, however, transferred one important growth factor from the unidentified to the identified group of nutrients. This discovery of another vitamin of the B complex has increased the difficulty of demonstrating unidentified growth factors and has forced investigators to improve their techniques used in making critical biological assays. Knowledge of the biological effects of antibiotics, methionine, and fat (carbohydrates) also has increased the difficulty of demonstrating unidentified growth factors.

To simplify biological assays with chicks for growth factors, the University of Delaware has developed balanced control diets and experimental diets by providing diets with adequate levels of known vitamins and trace minerals and balancing the calcium, phosphorus, protein, methionine, and energy levels of the diet. Fish products continue to show a highly significant growth response when added to and compared with negative control diets. However, in time the unidentified nutrient factor or factors in fish products will yield to identification as have many other factors in the past decade.

For the present, fish products are a very good buy in animal nutrients because of their unidentified growth factor or factors and the high biological value of their fish proteins. The proteins in a ton of average quality fish meal contain approximately 76 pounds of arginine, 36 pounds of methionine, 13 pounds of cystine, 80 pounds of lysine, and 14 pounds of tryptophane. These are the amino acids most likely to be deficient in poultry diets and which are most essential for growth. At current market prices for pure amino acids these are worth $1,178, if the feed producer had to buy them separately for use in fortifying his poultry feeds.

6.15

cannot be recommended as a routine operation because of the inherent variability in the raw material. The factors causing this variability are only partially understood. Therefore, no recommendations can be made at the present time for modification of the handling and processing of condensed solubles to yield a product suitable for this purpose. None of the additives were effective in overcoming undesirable characteristics.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.: Price 20 cents.

6.3 IRISH MOSS IN THE MARITIME PROVINCES

MacFarlane, Constance I.
Nova Scotia Research Foundation Bulletin, Halifax, Nova Scotia (1956)

This bulletin was written to assist those who may wish to identify, find, and dry Irish moss for market. It is a partial revision of the Fisheries Research Board of Canada, Atlantic Biological Station Circular No. 10 by A. W. H. Needler, 1947, and contains material and excerpts from that paper.

Irish moss or Chondrus crispus is a small perennial seaweed that grows attached to rocks near low water or beyond it. Chondrus grows from New Jersey to Newfoundland along the coast and in many areas it is sufficiently abundant for commercial harvesting. Chondrus is a short and sturdy plant repeatedly branched near the tips. Multiple branching gives this seaweed a crisp tufted appearance somewhat resembling parsley. The color depends on the season, on the chemical constitution of the water, and on the amount of sunlight available. In shallow water and exposed to sunlight, the color is a yellowish green in summer and brown in autumn. In deep water or in shaded water the plants are reddish purple, frequently with irridescence. When dried, the plants darken so that unbleached dried moss is known to the trade as "black" moss. The cleanest and usually the best Irish moss grows in somewhat exposed situations, though good moss may often be found in sheltered places as well.

Growth and season for harvesting.--With increasing daylight and gradual warming of the water in spring and early summer, the rate of growth increases and plants grow rapidly, becoming mature in summer, and fruiting in summer and autumn. Plants are best harvested when full grown. The season when "mossing" should begin depends on the region and the prevailing weather conditions. Chondrus is best gathered by raking, either from a skiff or a dory, or possibly from the shore itself.

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 ABSTRACTER: Martin Heerdt

6.4 USE OF FISH OILS FOR ORE FLOTATION

Anonymous
Commercial Fisheries Review 18, 17-18 (May 1956)

During the early 1920's fish oil was one of the oils used as a collector in ore flotation. In flotation, a separation is effected by concentrating low-grade ores by the use of a collector to form a foam that floats the lighter siliceous particles on the top and allows the heavier ore particles to sink to the bottom.

Research by producers of animal and vegetable oils later demonstrated that separated fatty acids or derivatives of fatty acids are more efficient collectors than the oils themselves. As similar research was not done on fish oils, they were dropped as a source of material for the ore flotation process.

The quantity of oil derivatives used for this process is not large in proportion to the weight of ore treated, amounting to only about one-half pound per ton. In the past, when ore flotation was used mainly in the concentration of certain sulfide ores, the potential market for oils for this purpose was not very large. Now, however, with the depletion of high-grade iron ores in the United States and the possibility of ore flotation becoming a major method of concentrating low-grade ores, the potential requirement of oil derivatives for this purpose is far greater than in the past.

An investigation has now been undertaken at the University of Minnesota School of Mines and Metallurgy to determine the value of fish-oil derivatives as ore collectors for concentrating low-grade iron cres, sulfide ores, and other ores. The initial work is being concentrated on use for iron ore flotation. The work is being supported by Saltonstall-Kennedy funds.

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 ABSTRACTER: Kathryn L. Osterhaug

6.52 FEEDING MACKEREL AND HERRING TO MINK KITS

Nielsen, K. Hovgaard
Dansk Pelsdyraul 18, 223-225 (June 1955)

Weanling kits were allotted to groups of 5 males and 5 females each and fed the following diets containing only fish as the source of animal protein:

	Before August	After August
	%	%
1. Fjaersing* (Trachinus draco)	80	66
2. Fjaersing	20	15
mackerel	60	51
3. Fjaersing	20	15
herring	60	51
boiled oatmeal	16	30
wheat middlings	1	1
alfalfa meal	1	1
dried yeast	1**	1**
bone meal	1	1

* Fjaersing (Danish) (Trachinus draco) 25 to 30 cm., limit 40 cm. (Trachinus vipera) 10 to 15 cm. Not important as food fish.

Family - Trachinidae.--This family of fishes have long bodies with rather flat sides including the head. The gill cover has a large spine. The first or spinous dorsal fin has 6 spines. These spines and also the gillcover spines are connected with poison glands. The poison runs in a groove

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 ABSTRACTER: G. A. Sundstrom

7.7 A RAPID METHOD DETERMINING THE CONCENTRATION OF STICKWATER

Clifton, J. M. (F. F. Balaena)
Norsk-Hvalfangst-Tidende 44, No. 4, 205-207 (1955)

Samples of stickwater containing 13 to 65 percent total dissolved solids obtained from wet rendered whale bone and meat have shown a refractive index that increases evenly with increasing concentration and gives the total dissolved solids present in stickwater within 1 percent accuracy. Plots of data showed the same refractive index/total dissolved solids curve for any one kind of raw material. Different raw materials gave similar curves. Variation in refractometer temperature between 18 and 80° had only a slight effect on the readings obtained; therefore all tests were run at room temperature without the use of cooling water. Tests with unfiltered and filtered samples showed that traces of oil and solid particles do not interfere greatly with ease of reading or the value obtained. A calibration curve was drawn from data obtained from a kieselguhr-filtered sample that was evaporated to 70 to 80 percent solids, cooled to room temperature, read on the refractometer, evaporated to dryness in an oven in the usual way to determine its solids content, then diluted with varying known amounts of distilled water, and reread on the refractometer.

 ABSTRACTER: Martin Heerdt

6.4 (Cross Reference: 0.8)

"Preliminary work has developed a procedure for comparing the efficiency of fish-oil-derivative collectors with oleic acid as a standard using laboratory and pilot-plant scale techniques. On a theoretical basis, fish oils with longer chain fatty acids combined with a high degree of unsaturation should offer certain advantages over material now used. In initial tests fish-oil fatty acids have been used successfully in experimental tests and have been found to form a foam which is tougher and more tenacious than that produced with oleic acid."

7.7 (Cross Reference: 6.15)

6.3

Drying.--The moss should be spread out in a thin layer in a clean spot immediately after harvesting, otherwise the moss heats and spoils rapidly. Certain coastal regions have extensive areas of clean flat rock suitable for drying the moss. Flakes made of laths nailed to two side rails are equally satisfactory. If bleached moss is desired, the wet moss is spread in thin layers as for drying, kept moist with salt water, and turned frequently. One to three days are usually necessary for bleaching in mid-summer. Irish moss is suitable for storage when it contains not more than 18 to 20 percent moisture.

Storage.--Sand, shells, stones, periwinkles, and plants other than Irish moss, which were not removed when the seaweed was harvested must be discarded before the moss is packed into bales or bags. Irish moss gathered in America is used in foods, toothpaste, medicines, and other pharmaceuticals. All boats, trucks, drying areas and storage places for the moss must be clean. The dried moss is usually pressed and baled with a hay press before it is marketed. Small amounts shipped locally may be packed in burlap or heavy paper bags.

Standards of quality.--In order to assist those curing and shipping moss, the Canadian Department of Fisheries with the assistance of processing companies have drawn up standards of quality for use in marketing the moss according to grade.

Dulse.--Rhodymenia palmata or dulse also finds a ready market. Dulse is harvested by hand from rocks at very low water, is dried in the sun without difficulty; and used as a food relish.

6.52 (Cross Reference: 1.1, 1.2)

of the spine, this poison acts very much like that of the viper snakes.

Color: back - greenish brown, sides--brown, green, and yellow markings slanting towards the tail. Range: West African coast to Bergen, Norway and also in the Mediterranean, the Black Sea, Swedish West Coast.

They are to be found on sandy bottom where they dig themselves in the sand so that only the nose, eyes, and dorsal fins show. Food consists of small fish, shellfish (crabs), and worms. Spawn in summer, eggs are 1 mm. in diameter, good food fish. They are caught in trawl, and are marketed in form of fillets.

** The diets which contained herring meal had 1 percent additional dried yeast at expense of oatmeal.

None of the kits had any symptoms of yellow fat disease because the fish were less than one day out of water before the feeding.

		Data for groups		
		1	2	3
Average weight, July 1,	g.	565	568	560
" " Nov. 15,	g.	1353	1365	1338
" length	cm.	61.5	62.4	61.9
" fur quality,	points	3.55	3.53	3.35
" fur color,	points	3.28	3.43	3.48
" auction prices,	crowns	126.60	124.00	125.80

It is concluded that fish are satisfactory for feeding mink kits if absolutely fresh.

7.89 A RAPID METHOD FOR DETERMINING SHELL IN CRABMEAT UNDER ORDINARY LIGHT

Oakley, Margarethe and Breidenbach, Andrew W. (Bureau of Laboratories, Maryland State Department of Health, Baltimore 18, Maryland)
Journal of the Association of Official Agricultural Chemists 39, 531-532 (May 15, 1956)

Introduction.--The amount of shell in more than 200 one-pound samples of retail crabmeat varied from none to 350 pieces. Excess shell in crabmeat is recognized as undesirable; yet an official standard which limits the amount of shell in crabmeat is not available. A method is presented for staining the shell so that it may be removed and counted quickly.

Reagents and apparatus.--A 1-percent aqueous solution of Alizarin Red S.--C.I. No. 1034 was used as a reagent. Apparatus used was a No. 6, 8-inch diameter sieve and an electric malted-milk stirrer.

Procedure.--A representative sample, 57 grams (2 ounces), is weighed into the stirrer, and about 200 milliliters of water is added and stirred not longer than 30 seconds. The stirred material is transferred to a 600-milliliter beaker, 2 milliliters of alizarin solution is added,and the mixture allowed to stand for 30 minutes. The contents of the beaker is then poured through the sieve and the alizarin solution discarded. The sieve with the crabmeat on it is agitated in a 4-quart enamel basin containing sufficient dilute hydrochloric acid (1 to 100) to cover the meat. After all of the meat and shell have turned yellow, the sieve and its contents is removed from the basin and exposed to the air for 5 minutes. Shell fragments become a pink-lavender color and are easily picked from the yellow-stained meat. If the color fades before the shell can be separated, the color can be restored by agitating again in the dilute hydrochloric acid.

(over)

 ABSTRACTER: Martin Heerdt

8.42 THE CALCIUM AND PHOSPHORUS CONTENTS OF SOME FOREIGN AND DOMESTIC CANNED SARDINES

Da Costa, Antonio and Stern, Joseph A. (University of Washington, Seattle, Washington)
Food Research 21, 242-249 (March-April 1956)

Experimental.--If available, 3 or more brands from a specific area were sampled. Four cans from each brand were taken at random and the contents drained free of oil or other packing media. Fish from these 4 cans were combined, put through a meat grinder 3 times or ground in a blender jar for 3 minutes. Triplicate determinations were made on a 10-gram portion of each brand.

Methods.--Ash and ash solutions were prepared according to methods of the Association of Official Agricultural chemists (A.O.A.C.). Calcium was determined titrimetrically according to the micro-method of the A.O.A.C. Phosphorus was determined colorimetrically according to the method of Fiske and Subbarow, and Lowry and Lopez with a Coleman Universal Spectrophotometer, model 14.

Results.--The ash, calcium, and phosphorus content as well as can size, net weight, drained weight, type of oil, and weight of oil are summarized in table 2 (see over). The species of fish canned could not be determined on opening the cans. However, it is likely that the sardines canned in Portugal were Clupea pilchardus; in Japan, Sardinops melanosticta; in Norway and Sweden, Clupea harengus or Clupea sprattus; in Maine, Clupea harengus; and in California, Sardinops caerula. The absence of skin and scales altered the calcium and phosphorus content to a greater degree than the absence of bone.

(over)

 ABSTRACTER: Martin Heerdt

9.3 COMMERCIAL FISHERY LAWS AND REGULATIONS

Keefe, Ruth V.
Fishery Leaflet 168, United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C. (Revised May 1956)

In the absence of a Federal Treaty, fishery regulations of the continental United States have been traditionally subject to State rather than Federal jurisdiction.

At the present time the U. S. Fish and Wildlife Service alone, or through the International agencies on which the Service has representation, exercises some jurisdiction over several of the different fisheries. It consults with other agencies on conservation of fishery resources and exercises some jurisdiction over several of the fisheries including the halibut fishery of the eastern North Pacific and Bering Sea, and the sockeye salmon runs of the Fraser River.

Fishing gear that involves operations affecting navigation is subject to certain Federal laws, and requires the approval of the Department of the Army, Chief of Engineers, Washington 25, D. C.

The laws and regulations regarding foreign vessels and fish from same are administered by the Bureau of Customs.

Federal specifications are prepared for standards for fresh and frozen fishery products. These specifications are directed by the Federal Supply Board and are approved by the General Services Administration. Copies of these specifications may be obtained upon application, accompanied by payment for same, from the General Services Administration, Business Service Center, Region 3, Seventh and D Streets, SW., Washington 25, D. C. Single copies of product specifications required for bidding purposes are available without charge at the several GSA Regional Offices.

The Food, Drug, and Cosmetic Act, administered by the Food and Drug Administration, applies to all food products which move in interstate commerce. Provisions of the Act, applicable to fishery products include the prohibition of the addition of poisonous substances, and the shipment of foods

(over)

 ABSTRACTER: Mabel A. Edwards

9.4 UNIVERSITY OF CALIFORNIA OPENS SEAFOOD RESEARCH LABORATORY

Anonymous
Maine Coast Fisherman 11, 14 (October 1956)

California's first laboratory of basic research in seafood technology has been opened on the campus of the University of California at Berkeley.

The laboratory is equipped for experimental research on problems connected with the processing and preserving of seafoods. Present emphasis will be placed on finding the causes and possible cures for fish deterioration through oxidation.

Work done at the laboratory will be basic research on the chemistry and biochemistry of fish between the time it is caught and the time it is eaten. Emphasis will be on methods of preventing changes that lead to off-flavor, off-color, off-odors, and toughening.

Establishment of the laboratory is part of the planned development of the University's statewide Institute of Marine Resources, established in 1954. Its headquarters are on the La Jolla campus.

As the program of the Institute expands, a variety of other lines of inquiry will be possible. These will include such possibilities as plant nutrients from fish byproducts, synthesis of new food products from whole fish, or fish constituents, and new methods for processing marine products not hitherto considered edible.

 ABSTRACTER: Kathryn L. Osterhaug

DETECTING SHELL IN CRABMEAT

CANNED SARDINE ANALYSES

COMMERCIAL FISHERY LAWS

CALIFORNIA SEAFOOD LABORATORY

8.42 (Cross Reference: 1.2)

Table 2. Physical and chemical characteristics of some foreign and domestic canned sardines

Sardines	Can size	Oil		Av. No. fish	Total Av. wt. grams	Av. drain weight grams	Ash %	Ca mg./100 grams	P mg./100 grams	Ca:P ratio
		Type	Av. wt. grams							
Portuguese										
skin & bone-	1/4 usual 22	olive	12	5	110	98	2.1	44	340	1:8
less	1/4 club 30	olive	28	6-5	127	99	1.7	76	282	1:4
boneless	1/4 club 30	olive	15	6	129	114	2.7	438	498	1:1.1
boneless	5 1/4 oz.	olive	20	7	174	154	3.4	522	570	1:1.1
plain	1/4 club 30	olive	26	4	125	99	4.1	475	604	1:1.3
plain	1/4 club 30	peanut	20	6	130	110	4.1	675	654	1:1
tom. sauce	1/4 club 30	olive	19	8-5	129	110	3.5	664	605	1:0.9
Norwegian										
plain	1/4 usual 22	olive	15	25	107	92	2.6	332	485	1:1.5
plain	1/4 usual 22	sard.	22	18	114	92	4.4	470	565	1:1.2
tom. sauce	1/2 oval	--	37	7-11	279	242	2.8	302	457	1:1.5
Maine										
plain	No. 1/4	olive	9	10-12	113	104	4.0	396	550	1:1.4
plain	No. 1/4	sard.	23	4-5	127	104	2.6	275	440	1:1.6
California										
boneless	1/2 oblong	soy.	--	--	253	201	2.0	137	229	1:1.7
tom. sauce	No. 1 oval	--	97	6	444	350	2.9	334	410	1:1.2
Japanese										
tom. sauce	No. 1 oval	soy.	97	7-8	466	369	2.4	423	460	1:1.1
tom. sauce	No. 1 oval	--	80	11	456	392	2.3	350	450	1:1.3
Swedish										
plain	1/4 usual 22	olive	13	18	120	107	3.3	436	500	1:1.1

9.4

7.89 (Cross Reference: 1.86)

Discussion.--Ultraviolet light also causes the shell in crabmeat to fluoresce so that it can be easily separated from the meat. When the ultraviolet light procedure for removing shell from crabmeat was compared with the dye method, equal results were obtained. The total working time with the dye method, however, was shorter than the time with the light method. The contrast between the lavender-stained shell and the yellow meat in the dye method was much greater than the contrast between the fluorescing shell and the background of the meat in the ultraviolet method. The difference in contrast contributed to faster separation of the shell from the meat by the dye method. Maceration in the dye assured that no shell surrounded by layers of meat could go unnoticed.

9.3

which are unfit for food. It is illegal to label one fish with the name of another, and the common or usual name of the food is required to be on the label. The standards of identity, quality, and fill of the container must be declared. Where no standard has been issued the general provisions of the law apply.

All imported fishery products for human consumption must conform to the requirements of the Food, Drug, and Cosmetic Act. Shellfish must conform to the requirements of the states to which they go if they are to be accepted under the laws of the respective states. To prevent deception in advertising the Federal Trade Commission, in effect, fixes standards of identity by limiting the use of certain names to particular species in advertising.

The Public Health Service is particularly interested in shellfish and through cooperative arrangements endorses the sanitation control programs of the states meeting the minimum requirements it specifies.

The U. S. Tariff Commission examines the impact of imports on domestic producers and assesses tariff rates and other import restrictions.

Foreign policy and international relationships of the United States are supervised by the Department of State.

The Act of June 25, 1934, which is administered by the Secretary of the Interior through the Fish and Wildlife Service, established Federal authority for fishermen to conduct cooperative marketing enterprises in interstate and foreign commerce and restricted Federal supervision of such enterprises. In the Service's Branch of Commercial Fisheries is a section in which the cooperative marketing work is centered.

Inquiries about the fishery laws and regulations should be directed to the fishery agency of the state where the fishery operation is to be conducted. A list of the various state agencies is given.

1.1 RECENT EQUATORIAL TUNA RESEARCH

Tester, Albert L.
Pan American Fisherman 10, 10-11 (March 1956)

(Abstract of this article appears under 2.12 page 5 - November 1956)

1.1 VITAMINS IN NORWEGIAN FISHES II. VITAMINS IN DIFFERENT ORGANS FROM TUNA FISH (THUNNUS THYNNUS) CAUGHT OFF THE WEST COAST OF NORWAY

Braekkan, Olaf R.; Hausen, Kirsten; and Skogland, Thor
Report on Technological Research Concerning Norwegian Fish Industry 3, 15 (1955)

(Abstract of this article appears under 8.6 page 19 - October 1956)

1.10 QUEST FOR QUALITY BEGINS ABOARD TUNA FISHING VESSELS

Anonymous
Pacific Fisherman 54, 11 (January 1956)

(Abstract of this article appears under 3.33 page 19 - April 1956)

1.2 THE NUTRITIVE VALUE OF HERRING MEALS. 3. THE EFFECTS OF HEAT TREATMENT AND STORAGE TEMPERATURE

Biely, J.; March, B. E.; and Tarr, H. L. A.
Poultry Science 34, 1274-1279 (November 1955)

(Abstract of this article appears under 6.190 page 13 - July 1956)

1.2 DISTRIBUTION OF PYRIMIDINE BASES IN HERRING ROE DEOXYRIBONUCLEIC ACID

Kent, P. W.; Lucy, J. A.; and Ward, P. F. V.
The Biochemical Journal 62, 529-533 (December 1955)

(Abstract of this article appears under 0.36 page 1 - October 1956)

1.2 PROTEIN DECOMPOSITION IN SEMI-PRESERVED HERRING

Alm, Frithiof
Symposium on Nutritive Aspects of Preserved Foods, October 1954, Swedish Institute for Food Preservation Research Goteborg, Sweden Publication No. 115 (1956)

(Abstract of this article appears under 8.51 page 17 - December 1956)

1.87 (Cross Reference: 2.8)

SOUTH AFRICAN ROCK LOBSTER YEAR-ROUND LUXURY

Anonymous
Institutions 39, 181-183 (September 1956)

1.89 SQUID RHODOPSIN

Hubbard, Ruth and St. George, Robert C. C. (Biological Labs., Harvard University, Cambridge, Massachusetts)
Federation Proceedings 15, 277-278 (March 1956)

In vertebrates meta-rhodopsin is highly unstable; in the squid it is stable at temperatures below 15° C. and at pH 6.5.

1.89 A VITAMIN A ISOMER IN THE EYES OF MEGANYCTIPHANES NORVEGCIA

Fisher, L. R., Henry, K. M.; Kon, S. K.; Plack, P. A.; and Thompson, S. Y.
The Biochemical Journal 61, p. vi (September 1955)

(Abstract of this article appears under 5.111 page 7 - November 1956)

3.11 STUDIES ON THE ANTIBIOTIC ACTION OF FISH COMPONENTS

Tomiyasu, Yukio and Toyomizu, Masamichi
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 4, 253-261 (1955) (English abstract, figures, and tables)

VII. On the antibiotic action of the autoxidized calamary oil.--Autoxidized calamary oil, which is an effective antibiotic when added at the beginning of culture, inhibits the growth of bacteria independently of their gram staining characteristics, and shows weak antibiotic activity on molds and some strains of yeast and fungi imperfecti.

VIII. Fractionation of an antibiotic substance from autoxidized fish oils.--The antibiotic substance could not be fractionated by vacuum or steam distillation, but could be fractionated by urea segregation.

3.12 EFFECTIVENESS OF AUREOMYCIN ON KEEPING QUALITY OF SARDINES

Tomiyama, Tetuo; Nomura, Minoru; and Kuroki, Shunichi
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 4, 262-266 (1955) (English abstract and tables)

Overnight storage of sardines in coarsely cracked ice containing 10 to 20 ppm. chlortetracycline followed by storage at 4° to 8° C. without ice has been found effective for prolonging the storage life of sardines. The sardines were judged organoleptically or by their volatile base-N value. A 30 minute dip in a 5-percent salt brine containing 10 to 20 ppm. chlortetracycline also gave a preservative effect.

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemical Processing
Chemistry and Industry
Commercial Fisheries Review
Drug and Cosmetic Industry
FAO Fisheries Bulletin
Federation Proceedings
Feedstuffs
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fishing Gazette
Flour and Feed
Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Frosted Food Field
Gourmet
Industrial and Engineering Chemistry
Industrial Refrigeration
Institutions
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Meldinger Fra SSF (Herring Industry, Norway)
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

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Editorial Clerk (Typist)--Gladys K. Chandler

3.12 SORBIC ACID AS A FUNGISTATIC AGENT FOR FOODS IX. PHYSICO CHEMICAL CONSIDERATIONS IN USING SORBIC ACID TO PROTECT FOODS

Gooding, Chester M.; Melnick, Daniel; Lawrence, Robert L.; and Luckmann, Frederick H.
Food Research 20, 639-648 (November-December 1955)

(Abstract of this article appears under 7.595 page 17 - October 1956)

3.12 SORBIC ACID AS FUNGISTATIC AGENT FOR FOODS X. SPECTROMETRIC DETERMINATION OF SORBIC ACID IN FOODS IN GENERAL

Luckmann, Frederick H. and Melnick, Daniel
Food Research 20, 649-654 (November-December 1955)

(Abstract of this article appears under 7.595 page 17 - October 1956)

3.12 CHANGES OF SODIUM NITRITE IN ICE

Borowik, Jozef and Ostrowski, Stanislaw
Roczniki Panstwowego Zakladu Hig. 7, 35-42 (1956) (English summary)
Chemical Abstracts 50, 11551 (August 25, 1956)

The contents of $NaNO_2$ in different parts of ice blocks varied from 0.5 to 187 mg. percent. The av. values were 80 mg. %. During melting of crushed ice 58.2% of $NaNO_2$ was found in two first fractions of the collected water, corresponding to 28.7% of the melted ice. During 3-months-long storage of the ice blocks the initial content of $NaNO_2$ decreased by approx. 50%.

3.33 THE MAINE SARDINE INDUSTRY IS STILL GROWING

Anonymous
Canner and Freezer 122, 11-14 (April 30, 1956)

(Abstract of this article appears under 1.2 page 3 - December 1956)

3.33 (Cross Reference: 1.86)

ON THE MANUFACTURE OF CANNED CRAB FROM PARALITHODES CAMTSCHATICUS (TILESIUS)

Tanikawa, Eiichi; Akiba, Minoru; Takasawa, Naohiro; and Yamashita, Jiro (Faculty of Fisheries, Hokkaido University)
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 6, 397-411 (1955) (In English)

I. Velocity of bacterial decomposition of the meat of (Paralithodes camtschaticus).--When the volatile basic nitrogen rises above 20 milligram percent in the meat of (Paralithodes camtschaticus) or (Erimacrus isenbeckii) the meat has reached its limit of freshness for canning.
II. The relation between storing temperature and maximum storing time of (Paralithodes camtschaticus) meat as raw material for canned crab.
III. The relation between volatile basic nitrogen produced in crab meat during heating and the freshness of the meat.
IV. The influence of reducing materials in parchment paper upon the meat of canned crab.

6.190 EFFECT OF EQUALIZED FEED INTAKE ON THE RESPONSE OF CHICKS TO FISH MEAL

Moeller, M. W. and Scott, H. M. (Illinois Agricultural Experiment Station, Urbana)
Poultry Science 35, 491-492 (March 1956)

6.190 THE EFFECT OF VITAMIN E, DEHYDRATED ALFALFA MEAL AND CONDENSED FISH SOLUBLES UPON HATCHABILITY OF EGGS FROM BROAD BREASTED BRONZE HENS MAINTAINED ON LITTER

Ferguson, T. M.; Vaught, H. P.; Reid, B. L.; and Couch, J. R. (Texas A & M College, College Station, Texas)
Poultry Science 35, 872-875 (July 1956)

Dehydrated alfalfa meal, condensed fish solubles, and vitamin E fed in combination maintained hatchability at the same level throughout the entire twenty week study; this was 21 percent higher than the basal group during the ninth through the twentieth week. Supplements of any of the above when fed singly or combinations of any two resulted in a hatchability increase of from 4 to 12 percent over the basal group.

6.3 CHEMICAL STUDIES ON VOLATILE CONSTITUENTS OF SEAWEED

Katayama, Teruhisa
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 6, 412-428 (1955) (English abstract, figures, and tables)

III. On the terpenes of volatile constituents of Ulva pertusa k.--Compounds found to be present by chromatostrip technique in the volatile portion of Ulva pertusa are α-pinene, d-limonene, linalool, carvone, and α-terpineol.
IV. On the carbonyl compounds of volatile constituents of Ulva pertusa.
V. On volatile constituents of Enteromorpha sp.
VI. On volatile constituents of Sargassum sp.--Acetic, propionic, butyric, and valeric acids have been detected; and myristic, palmitic, and an unsaturated fatty acid have been isolated. α-pinene, d-limonene, terpinolene, 1:8-cineol, carvone, linalool, geraniol have been found in the neutral fraction.

7.51 A BIURET METHOD FOR DETERMINING FISH MUSCLE PROTEINS

Matsumoto, Juichiro J. and Kanamitsu, Tsunetoshi
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 4, 284-288 (1955) (English abstract, figures, and tables)

A reagent, which is composed of 0.4 percent $CuSO_45H_2O$, 8 percent NaOH and 0.2 percent glycerol, is added to an equal volume of muscle protein solution, and mixed. The mixture is allowed to stand 3 hours to overnight and is then centrifuged for 10 to 15 minutes at 3,000 r.p.m. or filtered through a No. 3 glass-filter. The optical density of the supernatant or the filtrate was evaluated at a wavelength of 545 mμ, and the protein concentration was calculated by the use of a coefficient previously determined.

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2.14 A STUDY ON FISHING CONDITION FOR SQUID IN WATERS OFF THE OKI ISLANDS. I. THE RELATIONSHIP BETWEEN METEOROLOGICAL FACTORS AND HAULS OF FIXED NETS

Kojima, Shumpei
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 4, 208-213 (1955) (English abstract, figures, and tables)

The catch seemed to decrease for a day or two after an atmospheric low pressure area approached the fixed net fishing grounds. An increase in the catch followed nights during which the atmospheric temperature fell by more than 3° C.

6.54 FISH MEAL - USE - AS FOOD

Dunn, J. S.
News and Fishing Industry Review 10, No. 9, 58 (September 1955) (South Africa)
World Fisheries Abstracts 7, 43 (January-February 1956)

9.11 ARCTIC AND SUB-ARCTIC MARINE RESOURCES

Corlett, John (Ministry of Agriculture, Fisheries and Food, Fisheries Laboratory, Lowestoft, England)
FAO Fisheries Bulletin 9, 63-78 (April-June 1956)

7.8 THE EFFECT OF ASSIGNMENT OF TESTING MATERIALS TO THE PAIRED AND ODD POSITION IN THE DUO-TRIO TASTE DIFFERENCE TEST

Mitchell, John W. (G. Heileman Brewing Company, La Crosse, Wisconsin)
Food Technology 10, 169-171 (April 1956)

7.81 DURATION OF SENSITIVITY IN TRIO TASTE TESTING

Mitchell, John W. (G. Heileman Brewing Company, La Crosse, Wisconsin)
Food Technology 10, 201-203 (April 1956)

The number of duo-trio tests on beer taken at a single testing session by each subject was increased from two to five. The extra tests (three, four, and five) rather than being less sensitive actually yielded significantly more correct responses than the first two tests.

7.81 RECORDING APPARATUS FOR MEASURING OXYGEN ABSORPTION

Lancaster, E. B.; Bitner, E. D.; and Beal, R. E. (Northern Utilization Research Branch, Peoria, Illinois)
The Journal of the American Oil Chemists' Society 33, 36-38 (January 1956)

9.14 (Cross Reference: 1.31)

CLASSIFICATION OF ESSENTIAL AMINO ACIDS FOR CHINOOK SALMON

Delong, Donald C.; Halver, John E.; and Mertz, Edwin T. (Salmon Nutrition Laboratory, U. S. Fish and Wildlife Service, Cook, Washington)
Federation Proceedings 15, 548 (March 1956)

The Chinook salmon requires the same 10 amino acids required by the weanling rat and pig, namely, arginine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine. The salmonid differs from the rat and pig, however, in its failure to synthesize any significant amounts of arginine.

9.14 WATER-SOLUBLE VITAMIN REQUIREMENTS OF CHINOOK SALMON

Halver, John E.
Federation Proceedings 15, 554 (March 1956)

Deficiency syndromes in chinook salmon were observed for thiamin, riboflavin, pyridoxine, pantothenic acid, inositol, biotin, choline and folic acid. The results with nicotinic acid and vitamin B_{12} suggested possible requirement, but lack of ascorbic acid and p-aminobenzoic acid did not produce any recognizable deficiency symptoms.

9.4 FISHING INDUSTRY RESEARCH INSTITUTE, CAPE TOWN, SOUTH AFRICA, 7TH ANNUAL REPORT OF THE DIRECTOR, 1ST APRIL, 1953 TO 31ST MARCH, 1954

Dreosti, G. M. (Cape Town)
Food Science Abstracts 28, 41 (February 1956)

9.4 FISHING INDUSTRY RESEARCH INSTITUTE, CAPE TOWN, SOUTH AFRICA, 8TH ANNUAL REPORT OF THE DIRECTOR, 1ST APRIL, 1954 TO 31ST MARCH, 1955

Dreosti, G. M. (Cape Town)
Food Science Abstracts 28, 42 (February 1956)

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INT.-DUP. SEC., WASH., D.C. 8696

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